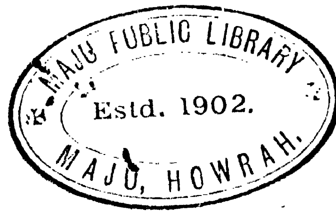


HERBERT SPENCER'S ESSAYS

(A SELECTION)

SEVEN ESSAYS

SELECTED FROM THE WORKS

OF

HERBERT SPENCER

[ISSUED FOR THE RATIONALIST PRESS ASSOCIATION, LIMITED, BY ARRANGEMENT WITH MR. HERBERT SPENCER'S TRUSTEES]

LONDON:
WATTS & CO.,
17 JOHNSON'S COURT, FLEET STREET, E.C.
1907

OF the Essays here reprinted, five were written in the decade between 1850 and 1860, when Spencer was gradually working his way along many converging lines of investigation to the fundamental principles of the *Synthetic Philosophy*. That on "The Development Hypothesis" (1852) is historically important as his first declaration of adherence to the evolutionary view. In "Progress: Its Law and Cause" (1857), the theory of evolution as a universal process is set forth at length, and, though only a single aspect of this process is recognised in it—that of the change from homogeneity to heterogeneity—the essay remains an illuminating exposition of one side of the Spencerian formula (see *First Principles*, Pt. II., chap. xv., and especially § 119, note). The "Genesis of Science" (1854) and "Manners and Fashion" (1854) illustrate the writer's habit of approaching every subject he handled from the evolutionary point of view. In the suggestive little paper on "Use and Beauty" (1852) the reader will find a capital example of Spencer's power of lighting up afresh every topic he touched. The two remaining essays, belonging to the years of the *Synthetic Philosophy*, are polemical. That on "Morals and Moral Sentiments" (1871) is directed against misrepresentations of certain of his ethical principles. That on "Mill *versus* Hamilton" (1865) forms part of an "amicable controversy" with Mill on the ultimate test of truth, and is thus closely connected with the *Psychology*. In an essay (1853) on "The Universal Postulate" (the general doctrine of which was afterwards embodied in the *Psychology*, Pt. VII., chaps. xi., xii.), Spencer had challenged Mill's position in the matter. His rejoinder in the present essay to Mill's reply is particularly important because it serves to bring out the difference between his psychological principles and methods and those of the older empiricist school.

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ESSAYS BY HERBERT SPENCER

PROGRESS: ITS LAW AND CAUSE

(1857)

THE current conception of progress is shifting and indefinite. Sometimes it comprehends little more than simple growth—as of a nation in the number of its members and the extent of territory over which it spreads. Sometimes it has reference to quantity of material products—as when the advance of agriculture and manufactures is the topic. Sometimes the superior quality of these products is contemplated; and sometimes the new or improved appliances by which they are produced. When, again, we speak of moral or intellectual progress, we refer to states of the individual or people exhibiting it; while, when the progress of Science, or Art, is commented upon, we have in view certain abstract results of human thought and action. Not only, however, is the current conception of progress more or less vague, but it is in great measure erroneous. It takes in not so much the reality of progress as its accompaniments—not so much the substance as the shadow. That progress in intelligence seen during the growth of the child into the man, or the savage into the philosopher, is commonly regarded as consisting in the greater number of facts known and laws understood; whereas the actual progress consists in those internal modifications of which this larger knowledge is the expression. Social progress is supposed to consist in the making of a greater quantity and variety of the articles required for satisfying men's wants; in the increasing security of person and property; in widening freedom of action; whereas, rightly understood, social progress consists in those changes of structure in the social organism which have entailed these consequences. The current conception is a teleological one. The phenomena are contemplated solely as bearing on human happiness. Only those changes are held to constitute progress which directly or indirectly tend to heighten human happiness; and they are thought to constitute progress simply *because* they tend to heighten human happiness. But rightly to understand progress, we must learn the nature of these changes, considered apart from our interests. Ceasing, for example, to regard the successive geological modifications that have taken place in the Earth, as modifications that have gradually fitted it for the habitation of Man, and as *therefore* constituting geological progress, we must ascertain the character common to these modifications—the law to which they all conform. And similarly in every other case. Leaving out of sight concomitants and beneficial consequences, let us ask what progress is in itself.

In respect to that progress which individual organisms display in the course of their evolution, this question has been answered by the Germans. The investigations of Wolff, Goethe, and von Baer, have established the truth that the series of changes gone through during the development of a seed into a tree, or an ovum into an animal, constitute an advance from homogeneity of structure to heterogeneity of structure. In its primary stage, every germ consists

of a substance that is uniform throughout, both in texture and chemical composition. The first step is the appearance of a difference between two parts of this substance; or, as the phenomenon is called in physiological language, a differentiation. Each of these differentiated divisions presently begins itself to exhibit some contrast of parts: and by and by these secondary differentiations become as definite as the original one. This process is continuously repeated—is simultaneously going on in all parts of the growing embryo; and by endless such differentiations there is finally produced that complex combination of tissues and organs constituting the adult animal or plant. This is the history of all organisms whatever. It is settled beyond dispute that organic progress consists in a change from the homogeneous to the heterogeneous.

Now, we propose in the first place to show, that this law of organic progress is the law of all progress. Whether it be in the development of the Earth, in the development of Life upon its surface, in the development of Society, of Government, of Manufactures, of Commerce, of Language, Literature, Science, Art, this same evolution of the simple into the complex, through successive differentiations, holds throughout. From the earliest traceable cosmical changes down to the latest results of civilization, we shall find that the transformation of the homogeneous into the heterogeneous, is that in which progress essentially consists.

With the view of showing that *if* the Nebular Hypothesis be true, the genesis of the solar system supplies one illustration of this law, let us assume that the matter of which the sun and planets consist was once in a diffused form; and that from the gravitation of its atoms there resulted a gradual concentration. By the hypothesis, the solar system in its nascent state existed as an indefinitely extended and nearly homogeneous medium — a medium almost homogeneous in density, in temperature, and in other physical attributes. The first change in the direction of increased aggregation, brought a contrast in density and a contrast in temperature, between the interior and the exterior of this mass. Simultaneously the drawing in of outer parts caused motions ending in rotation round a centre with various angular velocities. These differentiations increased in number and degree until there was evolved the organized group of sun, planets, and satellites, which we now know—a group which presents numerous contrasts of structure and action among its members. There are the immense contrasts between the sun and the planets, in bulk and in weight; as well as the subordinate contrasts between one planet and another, and between the planets and their satellites. There is the similarly-marked contrast between the sun as almost stationary (relatively to the other members of the Solar System), and the planets as moving round him with great velocity: while there are the secondary contrasts between the velocities and periods of the several planets, and between their simple revolutions and the double ones of their satellites, which have to move round their primaries while moving round the sun. There is the yet further strong contrast between the sun and the planets in respect of temperature; and there is good reason to suppose that the planets and satellites differ from each other in their proper heats, as well as in the amounts of heat they receive from the sun. When we bear in mind that, in addition to these various contrasts, the planets and satellites also differ in respect to their distances from each other and their primary; in respect to the inclinations of their orbits, the inclinations of their axes, their times of rotation on their axes, their specific gravities, and their physical constitutions; we see what a high degree of heterogeneity the solar system exhibits, when compared with the almost complete homogeneity

of the nebulous mass out of which it is supposed to have originated.

Passing from this hypothetical illustration, which must be taken for what it is worth, without prejudice to the general argument, let us descend to a more certain order of evidence. It is now generally agreed among geologists and physicists that the Earth was at one time a mass of molten matter. If so, it was at that time relatively homogeneous in consistence, and, in virtue of the circulation which takes place in heated fluids, must have been comparatively homogeneous in temperature; and it must have been surrounded by an atmosphere consisting partly of the elements of air and water, and partly of those various other elements which are among the more ready to assume gaseous forms at high temperatures. That slow cooling by radiation which is still going on at an inappreciable rate, and which, though originally far more rapid than now, necessarily required an immense time to produce any decided change, must ultimately have resulted in the solidification of the portion most able to part with its heat—namely, the surface. In the thin crust thus formed we have the first marked differentiation. A still further cooling, a consequent thickening of this crust, and an accompanying deposition of all solidifiable elements contained in the atmosphere, must finally have been followed by the condensation of the water previously existing as vapour. A second marked differentiation must thus have arisen; and as the condensation must have taken place on the coolest parts of the surface—namely, about the poles—there must thus have resulted the first geographical distinction of parts. To these illustrations of growing heterogeneity, which, though deduced from known physical laws, may be regarded as more or less hypothetical, Geology adds an extensive series that have been inductively established. Investigations show that the Earth has been continually becoming more heterogeneous in virtue of the multiplication of sedimentary strata which form its crust; also, that it has been becoming more heterogeneous in respect of the composition of these strata, the later of which, being made from the detritus of the earlier, are many of them rendered highly complex by the mixture of materials they contain; and further, that this heterogeneity has been vastly increased by the action of the Earth's still molten nucleus upon its envelope, whence have resulted not only many kinds of igneous rocks, but the tilting up of sedimentary strata at all angles, the formation of faults and metallic veins, the production of endless dislocations and irregularities. Yet again, geologists teach us that the Earth's surface has been growing more varied in elevation—that the most ancient mountain systems are the smallest, and the Andes and Himalayas the most modern; while in all probability there have been corresponding changes in the bed of the ocean. As a consequence of these ceaseless differentiations, we now find that no considerable portion of the Earth's exposed surface is like any other portion, either in contour, in geologic structure, or in chemical composition; and that in most parts it changes from mile to mile in all these characters. Moreover, there has been simultaneously going on a differentiation of climates. As fast as the Earth cooled and its crust solidified, there arose appreciable differences in temperature between those parts of its surface more exposed to the sun and those less exposed. As the cooling progressed, these differences became more pronounced; until there finally resulted those marked contrasts between regions of perpetual ice and snow, regions where winter and summer alternately reign for periods varying according to the latitude, and regions where summer follows summer with scarcely an appreciable variation. At the same time the many and varied elevations and subsidences of portions of the Earth's crust, bringing about the present irregular distribution of land

and sea, have entailed modifications of climate beyond those dependent on latitude; while a yet further series of such modifications have been produced by increasing differences of elevation in the land, which have in sundry places brought arctic, temperate, and tropical climates to within a few miles of one another. And the general outcome of these changes is, that not only has every extensive region its own meteorologic conditions, but that every locality in each region differs more or less from others in those conditions; as in its structure, its contour, its soil. Thus, between our existing Earth, the phenomena of whose crust neither geographers, geologists, mineralogists, nor meteorologists have yet enumerated, and the molten globe out of which it was evolved, the contrast in heterogeneity is extreme.

When from the Earth itself we turn to the plants and animals which have lived, or still live, upon its surface, we find ourselves in some difficulty from lack of facts. That every existing organism has been developed out of the simple into the complex, is indeed the first established truth of all; and that every organism which existed in past times was similarly developed, is an inference no physiologist will hesitate to draw. But when we pass from individual forms of life to Life in general, and inquire whether the same law is seen in the *ensemble* of its manifestations,—whether modern plants and animals are of more heterogeneous structure than ancient ones, and whether the Earth's present Flora and Fauna are more heterogeneous than the Flora and Fauna of the past,—we find the evidence so fragmentary, that every conclusion is open to dispute. Three-fifths of the Earth's surface being covered by water; a great part of the exposed land being inaccessible to, or untravelled by, the geologist; the greater part of the remainder having been scarcely more than glanced at; and even the most familiar portions, as England, having been so imperfectly explored that a new series of strata has been added within these four years,—it is impossible for us to say with certainty what creatures have, and what have not, existed at any particular period. Considering the perishable nature of many of the lower organic forms, the metamorphosis of numerous sedimentary strata, and the great gaps occurring among the rest, we shall see further reason for distrusting our deductions. On the one hand, the repeated discovery of vertebrate remains in strata previously supposed to contain none,—of reptiles where only fish were thought to exist,—of mammals where it was believed there were no creatures higher than reptiles,—renders it daily more manifest how small is the value of negative evidence. On the other hand, the worthlessness of the assumption that we have discovered the earliest, or anything like the earliest, organic remains, is becoming equally clear. That the oldest known sedimentary rocks have been greatly changed by igneous action, and that still older ones have been totally transformed by it, is becoming undeniable. And the fact that sedimentary strata earlier than any we know, have been melted up, being admitted, it must also be admitted that we cannot say how far back in time this destruction of sedimentary strata has been going on. Thus the title *Palæozoic*, as applied to the earliest known fossiliferous strata, involves a *petitio principii*; and, for aught we know to the contrary, only the last few chapters of the Earth's biological history may have come down to us. On neither side, therefore, is the evidence conclusive. Nevertheless we cannot but think that, scanty as they are, the facts, taken altogether, tend to show both that the more heterogeneous organisms have been evolved in the later geologic periods, and that Life in general has been more heterogeneously manifested as time has advanced. Let us cite, in illustration, the one case of the *Vertebrata*. The earliest known vertebrate remains are those of Fishes; and Fishes are the most homogeneous of the

vertebrata. Later and more heterogeneous are Reptiles. Later still, and more heterogeneous still, are Birds and Mammals. If it be said that the Palæozoic deposits, not being estuary deposits, are not likely to contain the remains of terrestrial vertebrata, which may nevertheless have existed at that era, we reply that we are merely pointing to the leading facts, *such as they are.* But to avoid any such criticism, let us take the mammalian sub-division only. The earliest known remains of mammals are those of small marsupials, which are the lowest of the mammalian type; while, conversely, the highest of the mammalian type—Man—is the most recent. The evidence that the vertebrate fauna, as a whole, has become more heterogeneous, is considerably stronger. To the argument that the vertebrate fauna of the Palæozoic period, consisting, so far as we know, entirely of Fishes, was less heterogeneous than the modern vertebrate fauna, which includes Reptiles, Birds, and Mammals, of multitudinous genera, it may be replied, as before, that estuary deposits of the Palæozoic period, could we find them, might contain other orders of vertebrata. But no such reply can be made to the argument that whereas the marine vertebrata of the Palæozoic period consisted entirely of cartilaginous fishes, the marine vertebrata of later periods include numerous genera of osseous fishes; and that, therefore, the later marine vertebrate faunas are more heterogeneous than the oldest known one. Nor, again, can any such reply be made to the fact that there are far more numerous orders and genera of mammalian remains in the tertiary formations than in the secondary formations. Did we wish merely to make out the best case, we might dwell upon the opinion of Dr. Carpenter, who says that "the general facts of Palæontology appear to sanction the belief, that *the same plan* may be traced out in what may be called *the general life of the globe*, as in *the individual life* of every one of the forms of organized being which now people it." Or we might quote, as decisive, the judgment of Professor Owen, who holds that the earlier examples of each group of creatures severally departed less widely from archetypal generality than the later examples—were severally less unlike the fundamental form common to the group as a whole; and thus constituted a less heterogeneous group of creatures. But in deference to an authority for whom we have the highest respect, who considers that the evidence at present obtained does not justify a verdict either way, we are content to leave the question open.[1]

Whether an advance from the homogeneous to the heterogeneous is or is not displayed in the biological history of the globe, it is clearly enough displayed in the progress of the latest and most heterogeneous creature—Man. It is true alike that, during the period in which the Earth has been peopled, the human organism has grown more heterogeneous among the civilized divisions of the species; and that the species, as a whole, has been growing more heterogeneous in virtue of the multiplication of races and the differentiation of these races from each other. In proof of the first of these positions, we may cite the fact that, in the relative development of the limbs, the civilized man departs more widely from the general type of the placental mammalia than do the lower human races. While often possessing well-developed body and arms, the Australian has very small legs: thus reminding us of the chimpanzee and the gorilla, which present no great contrasts in size between the hind and fore limbs.

[1] Since this was written (in 1857) the advance of paleontological discovery, especially in America, has shown conclusively, in respect of certain groups of vertebrates, that higher types have arisen by modifications of lower; so that, in common with others, Prof. Huxley, to whom the above allusion is made, now admits, or rather asserts, biological progression, and, by implication, that there have arisen more heterogeneous organic forms and a more heterogeneous assemblage of organic forms.

But in the European, the greater length and massiveness of the legs have become marked—the fore and hind limbs are more heterogeneous. Again, the greater ratio which the cranial bones bear to the facial bones illustrates the same truth. Among the vertebrata in general, progress is marked by an increasing heterogeneity in the vertebral column, and more especially in the segments constituting the skull: the higher forms being distinguished by the relatively larger size of the bones which cover the brain, and the relatively smaller size of those which form the jaws, &c. Now this characteristic, which is stronger in Man than in any other creature, is stronger in the European than in the savage. Moreover, judging from the greater extent and variety of faculty he exhibits, we may infer that the civilized man has also a more complex or heterogeneous nervous system than the uncivilized man: and, indeed, the fact is in part visible in the increased ratio which his cerebrum bears to the subjacent ganglia, as well as in the wider departure from symmetry in its convolutions. If further elucidation be needed, we may find it in every nursery. The infant European has sundry marked points of resemblance to the lower human races; as in the flatness of the alæ of the nose, the depression of its bridge, the divergence and forward opening of the nostrils, the form of the lips, the absence of a frontal sinus, the width between the eyes, the smallness of the legs. Now, as the developmental process by which these traits are turned into those of the adult European, is a continuation of that change from the homogeneous to the heterogeneous displayed during the previous evolution of the embryo, which every anatomist will admit; it follows that the parallel developmental process by which the like traits of the barbarous races have been turned into those of the civilized races, has also been a continuation of the change from the homogeneous to the heterogeneous. The truth of the second position—that Mankind, as a whole, have become more heterogeneous—is so obvious as scarcely to need illustration. Every work on Ethnology, by its divisions and subdivisions of races, bears testimony to it. Even were we to admit the hypothesis that Mankind originated from several separate stocks, it would still remain true, that as, from each of these stocks, there have sprung many now widely-different tribes, which are proved by philological evidence to have had a common origin, the race as a whole is far less homogeneous than it once was. Add to which, that we have, in the Anglo-American, an example of a new variety arising within these few generations; and that, if we may trust to the descriptions of observers, we are likely soon to have another such example in Australia.

On passing from Humanity under its individual form to Humanity as socially embodied, we find the general law still more variously exemplified. The change from the homogeneous to the heterogeneous is displayed in the progress of civilization as a whole, as well as in the progress of every nation; and is still going on with increasing rapidity. As we see in existing barbarous tribes, society in its first and lowest form is a homogeneous aggregation of individuals having like powers and like functions: the only marked difference of function being that which accompanies difference of sex. Every man is warrior, hunter, fisherman, tool-maker, builder; every woman performs the same drudgeries. Very early, however, in the course of social evolution, there arises an incipient differentiation between the governing and the governed. Some kind of chieftainship seems coeval with the first advance from the state of separate wandering families to that of a nomadic tribe. The authority of the strongest or the most cunning makes itself felt among a body of savages as in a herd of animals, or a posse of schoolboys. At first, however, it is indefinite, uncertain; is shared by others of scarcely inferior power; and is unaccompanied by any

difference in occupation or style of living: the first ruler kills his own game, makes his own weapons, builds his own hut, and, economically considered, does not differ from others of his tribe. Gradually, as the tribe progresses, the contrast between the governing and the governed grows more decided. Supreme power becomes hereditary in one family; the head of that family, ceasing to provide for his own wants, is served by others; and he begins to assume the sole office of ruling. At the same time there has been arising a co-ordinate species of government—that of Religion. As all ancient records and traditions prove, the earliest rulers are regarded as divine personages. The maxims and commands they uttered during their lives are held sacred after their deaths, and are enforced by their divinely-descended successors; who in their turns are promoted to the pantheon of the race, here to be worshipped and propitiated along with their predecessors: the most ancient of whom is the supreme god, and the rest subordinate gods. For a long time these connate forms of government—civil and religious—remain closely associated. For many generations the king continues to be the chief priest, and the priesthood to be members of the royal race. For many ages religious law continues to include more or less of civil regulation, and civil law to possess more or less of religious sanction; and even among the most advanced nations these two controlling agencies are by no means completely separated from each other. Having a common root with these, and gradually diverging from them, we find yet another controlling agency—that of Ceremonial usages. All titles of honour are originally the names of the god-king; afterwards of the god and the king; still later of persons of high rank; and finally come, some of them, to be used between man and man. All forms of complimentary address were at first the expressions of submission from prisoners to their conqueror, or from subjects to their ruler, either human or divine—expressions which were afterwards used to propitiate subordinate authorities, and slowly descended into ordinary intercourse. All modes of salutation were once obeisances made before the monarch and used in worship of him after his death. Presently others of the god-descended race were similarly saluted; and by degrees some of the salutations have become the due of all.[1] Thus, no sooner does the originally-homogeneous social mass differentiate into the governed and the governing parts, than this last exhibits an incipient differentiation into religious and secular—Church and State; while at the same time there begins to be differentiated from both, that less definite species of government which rules our daily intercourse—a species of government which, as we may see in heralds' colleges, in books of the peerage, in masters of ceremonies, is not without a certain embodiment of its own. Each of these is itself subject to successive differentiations. In the course of ages, there arises, as among ourselves, a highly complex political organization of monarch, ministers, lords and commons, with their subordinate administrative departments, courts of justice, revenue offices, &c., supplemented in the provinces by municipal governments, county governments, parish or union governments—all of them more or less elaborated. By its side there grows up a highly complex religious organization, with its various grades of officials, from archbishops down to sextons, its colleges, convocations, ecclesiastical courts, &c.; to all which must be added the ever-multiplying independent sects, each with its general and local authorities. And at the same time there is developed a highly complex aggregation of customs, manners, and temporary fashions, enforced by society at large, and serving to

[1] For detailed proof of these assertions see essay on "Manners and Fashion."

control those minor transactions between man and man which are not regulated by civil and religious law. Moreover, it is to be observed that this increasing heterogeneity in the governmental appliances of each nation, has been accompanied by an increasing heterogeneity in the assemblage of governmental appliances of different nations: all nations being more or less unlike in their political systems and legislation, in their creeds and religious institutions, in their customs and ceremonial usages.

Simultaneously there has been going on a second differentiation of a more familiar kind; that, namely, by which the mass of the community has been segregated into distinct classes and orders of workers. While the governing part has undergone the complex development above detailed, the governed part has undergone an equally complex development, which has resulted in that minute division of labour characterizing advanced nations. It is needless to trace out this progress from its first stages, up through the caste-divisions of the East and the incorporated guilds of Europe, to the elaborate producing and distributing organization existing among ourselves. It has been an evolution which, beginning with a tribe whose members severally perform the same actions each for himself, ends with a civilized community whose members severally perform different actions for each other; and an evolution which has transformed the solitary producer of any one commodity into a combination of producers who, united under a master, take separate parts in the manufacture of such commodity. But there are yet other and higher phases of this advance from the homogeneous to the heterogeneous in the industrial organization of society. Long after considerable progress has been made in the division of labour among different classes of workers, there is still little or no division of labour among the widely separated parts of the community: the nation continues comparatively homogeneous in the respect that in each district the same occupations are pursued. But when roads and other means of transit become numerous and good, the different districts begin to assume different functions, and to become mutually dependent. The calico manufacture locates itself in this county, the woollen-cloth manufacture in that; silks are produced here, lace there; stockings in one place, shoes in another; pottery, hardware, cutlery, come to have their special towns; and ultimately every locality becomes more or less distinguished from the rest by the leading occupation carried on in it. This subdivision of functions shows itself not only among the different parts of the same nation, but among different nations. That exchange of commodities which free-trade is increasing so largely, will ultimately have the effect of specializing, in a greater or less degree, the industry of each people. So that, beginning with a barbarous tribe, almost if not quite homogeneous in the functions of its members, the progress has been, and still is, towards an economic aggregation of the whole human race; growing ever more heterogeneous in respect of the separate functions assumed by separate nations, the separate functions assumed by the local sections of each nation, the separate functions assumed by the many kinds of makers and traders in each town, and the separate functions assumed by the workers united in producing each commodity.

The law thus clearly exemplified in the evolution of the social organism, is exemplified with equal clearness in the evolution of all products of human thought and action; whether concrete or abstract, real or ideal. Let us take Language as our first illustration.

The lowest form of language is the exclamation, by which an entire idea is vaguely conveyed through a single sound, as among the lower animals. That human language ever consisted solely of exclamations, and so was strictly homogeneous in respect of its parts of speech, we have no evidence.

But that language can be traced down to a form in which nouns and verbs are its only elements, is an established fact. In the gradual multiplication of parts of speech out of these primary ones—in the differentiation of verbs into active and passive, of nouns into abstract and concrete—in the rise of distinctions of mood, tense, person, of number and case—in the formation of auxiliary verbs, of adjectives, adverbs, pronouns, prepositions, articles—in the divergence of those orders, genera, species, and varieties of parts of speech by which civilized races express minute modifications of meaning—we see a change from the homogeneous to the heterogeneous. Another aspect under which we may trace the development of language is the divergence of words having common origins. Philology early disclosed the truth that in all languages words may be grouped into families, the members of each of which are allied by their derivation. Names springing from a primitive root, themselves become the parents of other names still further modified. And by the aid of those systematic modes which presently arise, of making derivatives and forming compound terms, there is finally developed a tribe of words so heterogeneous in sound and meaning, that to the uninitiated it seems incredible they should be nearly related. Meanwhile from other roots there are being evolved other such tribes, until there results a language of some sixty thousand or more unlike works, signifying as many unlike objects, qualities, acts. Yet another way in which language in general advances from the homogeneous to the heterogeneous, is in the multiplication of languages. Whether all languages have grown from one stock, or whether, as some philologists think, they have grown from two or more stocks, it is clear that since large groups of languages, as the Indo-European, are of one parentage, they have become distinct through a process of continuous divergence. The same diffusion over the Earth's surface which has led to differentiations of race, has simultaneously led to differentiations of speech: a truth which we see further illustrated in each nation by the distinct dialects found in separate districts. Thus the progress of Language conforms to the general law, alike in the evolution of languages, in the evolution of families of words, and in the evolution of parts of speech.

On passing from spoken to written language, we come upon several classes of facts, having similar implications. Written language is connate with Painting and Sculpture; and at first all three are appendages of Architecture, and have a direct connection with the primary form of all Government—the theocratic. Merely noting by the way the fact that sundry wild races, as for example the Australians and the tribes of South Africa, are given to depicting personages and events upon the walls of caves, which are probably regarded as sacred places, let us pass to the case of the Egyptians. Among them, as also among the Assyrians, we find mural paintings used to decorate the temple of the god and the palace of the king (which were, indeed, originally identical); and as such they were governmental appliances in the same sense as state-pageants and religious feasts were. They were governmental appliances in another way: representing as they did the worship of the god, the triumphs of the god-king, the submission of his subjects, and the punishment of the rebellious. Further, they were governmental, as being the products of an art reverenced by the people as a sacred mystery. From the habitual use of this pictorial representation there grew up the but-slightly-modified practice of picture-writing—a practice which was found still extant among North American peoples at the time they were discovered. By abbreviations analogous to those still going on in our own written language, the most frequently-recurring of these pictured figures were successively simplified; and ultimately there grew up a

system of symbols, most of which had but distant resemblances to the things for which they stood. The inference that the hieroglyphics of the Egyptians were thus produced, is confirmed by the fact that the picture-writing of the Mexicans was found to have given birth to a like family of ideographic forms; and among them, as among the Egyptians, these had been partially differentiated into the *kuriological* or imitative, and the *tropical* or symbolic; which were, however, used together in the same record. In Egypt, written language underwent a further differentiation, whence resulted the *hieratic* and the *epistolographic* or *enchorial;* both of which are derived from the original hieroglyphic. At the same time we find that for the expression of proper names, which could not be otherwise conveyed, signs having phonetic values were employed; and though it is alleged that the Egyptians never achieved complete alphabetic writing, yet it can scarcely be doubted that these phonetic symbols, occasionally used in aid of their ideographic ones, were the germs of an alphabetic system. Once having become separate from hieroglyphics, alphabetic writing itself underwent numerous differentiations—multiplied alphabets were produced; between most of which, however, more or less connection can still be traced. And in each civilized nation there has now grown up, for the representation of one set of sounds, several sets of written signs used for distinct purposes. Finally, from writing diverged printing; which, uniform in kind as it was at first, has since become multiform.

While written language was passing through its first stages of development, the mural decoration which contained its root was being differentiated into Painting and Sculpture. The gods, kings, men, and animals represented, were originally marked by indented outlines and coloured. In most cases these outlines were of such depth, and the object they circumscribed so far rounded and marked out in its leading parts, as to form a species of work intermediate between intaglio and bas-relief. In other cases we see an advance upon this: the raised spaces between the figures being chiselled off, and the figures themselves appropriately tinted, a painted bas-relief was produced. The restored Assyrian architecture at Sydenham exhibits this style of art carried to greater perfection —the persons and things represented, though still barbarously coloured, are carved out with more truth and in greater detail: and in the winged lions and bulls used for the angles of gateways, we may see a considerable advance towards a completely sculptured figure; which, nevertheless, is still coloured, and still forms part of the building. But while in Assyria the production of a statue proper seems to have been little, if at all, attempted, we may trace in Egyptian art the gradual separation of the sculptured figure from the wall. A walk through the collection in the British Museum shows this; while at the same time it affords an opportunity of observing the traces which the independent statues bear of their derivation from bas-relief: seeing that nearly all of them not only display that fusion of the legs with one another and of the arms with the body which is characteristic of bas-relief, but have the back united from head to foot with a block which stands in place of the original wall. Greece repeated the leading stages of this progress. On the friezes of Greek Temples, were coloured bas-reliefs representing sacrifices, battles, processions, games—all in some sort religious. The pediments contained painted sculptures more or less united with the tympanum, and having for subjects the triumphs of gods or heroes. Even statues definitely separated from buildings were coloured; and only in the later periods of Greek civilization does the differentiation of Sculpture from Painting appear to have become complete. In Christian art we may trace a parallel re-genesis. All early works of art throughout Europe were religious in subject—represented

Christs, crucifixions, virgins, holy families, apostles, saints. They formed integral parts of church architecture, and were among the means of exciting worship; as in Roman Catholic countries they still are. Moreover, the sculptured figures of Christ on the cross, of virgins, of saints, were coloured; and it needs but to call to mind the painted madonnas still abundant in continental churches and highways, to perceive the significant fact that Painting and Sculpture continue in closest connection with each other where they continue in closest connection with their parent. Even when Christian sculpture became differentiated from painting, it was still religious and governmental in its subjects—was used for tombs in churches and statues of kings; while, at the same time, painting, where not purely ecclesiastical, was applied to the decoration of palaces, and besides representing royal personages, was mostly devoted to sacred legends. Only in recent times have painting and sculpture become quite separate and mainly secular. Only within these few centuries has Painting been divided into historical, landscape, marine, architectural, genre, animal, still-life, &c.; and Sculpture grown heterogeneous in respect of the variety of real and ideal subjects with which it occupies itself.

Strange as it seems then, we find that all forms of written language, of Painting, and of Sculpture, have a common root in the politico-religious decorations of ancient temples and palaces. Little resemblance as they now have, the landscape that hangs against the wall, and the copy of the *Times* lying on the table, are remotely akin. The brazen face of the knocker which the postman has just lifted, is related not only to the woodcuts of the *Illustrated London News* which he is delivering, but to the characters of the *billet-doux* which accompanies it. Between the painted window, the prayer-book on which its light falls, and the adjacent monument there is consanguinity. The effigies on our coins, the signs over shops, the coat of arms outside the carriage panel, and the placards inside the omnibus, are, in common with dolls and paper-hangings, lineally descended from the rude sculpture-paintings in which ancient peoples represented the triumphs and worship of their god-kings. Perhaps no example can be given which more vividly illustrates the multiplicity and heterogeneity of the products that in course of time may arise by successive differentiations from a common stock.

Before passing to other classes of facts, it should be observed that the evolution of the homogeneous into the heterogeneous is displayed not only in the separation of Painting and Sculpture from Architecture and from each other, and in the greater variety of subjects they embody, but it is further shown in the structure of each work. A modern picture or statue is of far more heterogeneous nature than an ancient one. An Egyptian sculpture-fresco usually represents all its figures as at the same distance from the eye; and so is less heterogeneous than a painting that represents them as at various distances from the eye. It exhibits all objects as exposed to the same degree of light; and so is less heterogeneous than a painting which exhibits its different objects and different parts of each object as in different degrees of light. It uses chiefly the primary colours, and these in their full intensities; and so is less heterogeneous than a painting which, introducing the primary colours but sparingly, employs numerous intermediate tints, each of heterogeneous composition, and differing from the rest not only in quality but in strength. Moreover, we see in these early works great uniformity of conception. The same arrangement of figures is perpetually reproduced—the same actions, attitudes, faces, dresses. In Egypt the modes of representation were so fixed that it was sacrilege to introduce a novelty. The Assyrian bas-reliefs display parallel characters. Deities, kings, attendants,

winged-figures and animals, are time after time depicted in like positions, holding like implements, doing like things, and with like expression or non-expression of face. If a palm-grove is introduced, all the trees are of the same height, have the same number of leaves, and are equidistant. When water is imitated, each wave is a counterpart of the rest; and the fish, almost always of one kind, are evenly distributed over the surface. The beards of the kings, the gods, and the winged figures, are everywhere similar; as are the manes of the lions, and equally so those of the horses. Hair is represented throughout by one form of curl. The king's beard is quite architecturally built up of compound tiers of uniform curls, alternating with twisted tiers placed in a transverse direction, and arranged with perfect regularity; and the terminal tufts of the bulls' tails are represented in exactly the same manner. Without tracing out analogous facts in early Christian art, in which, though less striking, they are still visible, the advance in heterogeneity will be sufficiently manifest on remembering that in the pictures of our own day the composition is endlessly varied; the attitudes, faces, expressions, unlike; the subordinate objects different in sizes, forms, textures; and more or less of contrast even in the smallest details. Or, if we compare an Egyptian statue, seated bolt upright on a block, with hands on knees, fingers parallel, eyes looking straight forward, and the two sides perfectly symmetrical in every particular, with a statue of the advanced Greek school or the modern school, which is asymmetrical in respect of the attitude of the head, the body, the limbs, the arrangement of the hair, dress, appendages, and in its relations to neighbouring objects, we shall see the change from the homogeneous to the heterogeneous clearly manifested.

In the co-ordinate origin and gradual differentiation of Poetry, Music, and Dancing, we have another series of illustrations. Rhythm in words, rhythm in sounds, and rhythm in motions, were in the beginning parts of the same thing, and have only in process of time become separate things. Among existing barbarous tribes we find them still united. The dances of savages are accompanied by some kind of monotonous chant, the clapping of hands, the striking of rude instruments: there are measured movements, measured words, and measured tones. The early records of historic races similarly show these three forms of metrical action united in religious festivals. In the Hebrew writings we read that the triumphal ode composed by Moses on the defeat of the Egyptians, was sung to an accompaniment of dancing and timbrels. The Israelites danced and sung "at the inauguration of the golden calf. And as it is generally agreed that this representation of the Deity was borrowed from the mysteries of Apis, it is probable that the dancing was copied from that of the Egyptians on those occasions." Again, in Greece the like relation is everywhere seen: the original type being there, as probably in other cases, a simultaneous chanting and mimetic representation of the life and adventures of the hero or the god. The Spartan dances were accompanied by hymns and songs; and in general the Greeks had "no festivals or religious assemblies but what were accompanied with songs and dances"—both of them being forms of worship used before altars. Among the Romans, too, there were sacred dances: the Salian and Lupercalian being named as of that kind. And even in Christian countries, as at Limoges, in comparatively recent times, the people have danced in the choir in honour of a saint. The incipient separation of these once-united arts from each other and from religion, was early visible in Greece. Probably diverging from dances partly religious, partly warlike, as the Corybantian, came the war-dances proper, of which there were various kinds. Meanwhile Music and Poetry, though still united, came to

have an existence separate from Dancing. The primitive Greek poems, religious in subject, were not recited but chanted; and though at first the chant of the poet was accompanied by the dance of the chorus, it ultimately grew into independence. Later still, when the poem had been differentiated into epic and lyric—when it became the custom to sing the lyric and recite the epic—poetry proper was born. As during the same period musical instruments were being multiplied, we may presume that music came to have an existence apart from words. And both of them were beginning to assume other forms besides the religious. Facts having like implications might be cited from the histories of later times and peoples; as the practices of our own early minstrels, who sang to the harp heroic narratives versified by themselves to music of their own composition: thus uniting the now separate offices of poet, composer, vocalist, and instrumentalist. But, without further illustration, the common origin and gradual differentiation of Dancing, Poetry, and Music will be sufficiently manifest.

The advance from the homogeneous to the heterogeneous is displayed not only in the separation of these arts from each other and from religion, but also in the multiplied differentiations which each of them afterwards undergoes. Not to dwell upon the numberless kinds of dancing that have, in course of time, come into use: and not to occupy space in detailing the progress of poetry, as seen in the development of the various forms of metre, of rhyme, and of general organization; let us confine our attention to music as a type of the group. As implied by the customs of still extant barbarous races, the first musical instruments were, without doubt, percussive—sticks, calabashes, tom-toms—and were used simply to mark the time of the dance; and in this constant repetition of the same sound, we see music in its most homogeneous form. The Egyptians had a lyre with three strings. The early lyre of the Greeks had four, constituting their tetrachord. In course of some centuries lyres of seven and eight strings were employed; and, by the expiration of a thousand years, they had advanced to their "great system" of the double octave. Through all which changes there of course arose a greater heterogeneity of melody. Simultaneously there came into use the different modes—Dorian, Ionian, Phrygian, Æolian, and Lydian—answering to our keys; and of these there were ultimately fifteen. As yet, however, there was but little heterogeneity in the time of their music. Instrumental music being at first merely the accompaniment of vocal music, and vocal music being subordinated to words,—the singer being also the poet, chanting his own compositions and making the lengths of his notes agree with the feet of his verses,—there resulted a tiresome uniformity of measure, which, as Dr. Burney says, "no resources of melody could disguise." Lacking the complex rhythm obtained by our equal bars and unequal notes, the only rhythm was that produced by the quantity of the syllables, and was of necessity comparatively monotonous. And further, it may be observed that the chant thus resulting, being like recitative, was much less clearly differentiated from ordinary speech than is our modern song. Nevertheless, in virtue of the extended range of notes in use, the variety of modes, the occasional variations of time consequent on changes of metre, and the multiplication of instruments, music had, towards the close of Greek civilization, attained to considerable heterogeneity—not indeed as compared with our music, but as compared with that which preceded it. Still, there existed nothing but melody: harmony was unknown. It was not until Christian church-music had reached some development, that music in parts was evolved; and then it came into existence through a very unobtrusive differentiation. Difficult as it may be to conceive *a priori* how the advance from melody to harmony could take place without a sudden leap, it is

none the less true that it did so. The circumstance which prepared the way for it was the employment of two choirs singing alternately the same air. Afterwards it became the practice—very possibly first suggested by a mistake—for the second choir to commence before the first had ceased; thus producing a fugue. With the simple airs then in use, a partially-harmonious fugue might not improbably thus result: and a very partially-harmonious fugue satisfied the ears of that age, as we know from still preserved examples. The idea having once been given, the composing of airs productive of fugal harmony would naturally grow up, as in some way it *did* grow up, out of this alternate choir-singing. And from the fugue to concerted music of two, three, four, and more parts, the transition was easy. Without pointing out in detail the increasing complexity that resulted from introducing notes of various lengths, from the multiplication of keys, from the use of accidentals, from varieties of time, and so forth, it needs but to contrast music as it is, with music as it was, to see how immense is the increase of heterogeneity. We see this if, looking at music in its *ensemble*, we enumerate its many different genera and species—if we consider the divisions into vocal, instrumental, and mixed; and their subdivisions into music for different voices and different instruments—if we observe the many forms of sacred music, from the simple hymn, the chant, the canon, motet, anthem, &c., up to the oratorio; and the still more numerous forms of secular music, from the ballad up to the serenata, from the instrumental solo up to the symphony. Again, the same truth is seen on comparing any one sample of aboriginal music with a sample of modern music—even an ordinary song for the piano; which we find to be relatively very heterogeneous, not only in respect of the variety in the pitches and in the lengths of the notes, the number of different notes sounding at the same instant in company with the voice, and the variations of strength with which they are sounded and sung, but in respect of the changes of key, the changes of time, the changes of *timbre* of the voice, and the many other modifications of expression. While between the old monotonous dance-chant and a grand opera of our own day, with its endless orchestral complexities and vocal combinations, the contrast in heterogeneity is so extreme that it seems scarcely credible that the one should have been the ancestor of the other.

Were they needed, many further illustrations might be cited. Going back to the early time when the deeds of the god-king were recorded in picture-writings on the walls of temples and palaces, and so constituted a rude literature, we might trace the development of Literature through phases in which, as in the Hebrew Scriptures, it presents in one work theology, cosmogony, history, biography, law, ethics, poetry; down to its present heterogeneous development, in which its separated divisions and subdivisions are so numerous and varied as to defy complete classification. Or we might trace out the evolution of Science; beginning with the era in which it was not yet differentiated from Art, and was, in union with Art, the handmaid of Religion; passing through the era in which the sciences were so few and rudimentary, as to be simultaneously cultivated by the same men; and ending with the era in which the genera and species are so numerous that few can enumerate them, and no one can adequately grasp even one genus. Or we might do the like with Architecture, with the Drama, with Dress. But doubtless the reader is already weary of illustrations; and our promise has been amply fulfilled. Abundant proof has been given that the law of organic development formulated by von Baer, is the law of all development. The advance from the simple to the complex, through a process of successive differentiations, is seen alike in the earliest changes of the Universe to

which we can reason our way back, and in the earliest changes which we can inductively establish; it is seen in the geologic and climatic evolution of the Earth; it is seen in the unfolding of every single organism on its surface, and in the multiplication of kinds of organisms; it is seen in the evolution of Humanity, whether contemplated in the civilized individual, or in the aggregate of races; it is seen in the evolution of Society in respect alike of its political, its religious, and its economical organization; and it is seen in the evolution of all those endless concrete and abstract products of human activity which constitute the environment of our daily life. From the remotest past which Science can fathom, up to the novelties of yesterday, that in which progress essentially consists, is the transformation of the homogeneous into the heterogeneous.

And now, must not this uniformity of procedure be a consequence of some fundamental necessity? May we not rationally seek for some all-pervading principle which determines this all-pervading process of things? Does not the universality of the *law* imply a universal *cause?*

That we can comprehend such cause, noumenally considered, is not to be supposed. To do this would be to solve that ultimate mystery which must ever transcend human intelligence. But it still may be possible for us to reduce the law of all progress, above set forth, from the condition of an empirical generalization, to the condition of a rational generalization. Just as it was possible to interpret Kepler's laws as necessary consequences of the law of gravitation; so it may be possible to interpret this law of progress, in its multiform manifestations, as the necessary consequence of some similarly universal principle. As gravitation was assignable as the *cause* of each of the groups of phenomena which Kepler generalized; so may some equally simple attribute of things be assignable as the cause of each of the groups of phenomena generalized in the foregoing pages. We may be able to affiliate all these varied evolutions of the homogeneous into the heterogeneous, upon certain facts of immediate experience, which, in virtue of endless repetition, we regard as necessary.

The probability of a common cause, and the possibility of formulating it, being granted, it will be well, first, to ask what must be the general characteristics of such cause, and in what direction we ought to look for it. We can with certainty predict that it has a high degree of abstractness; seeing that it is common to such infinitely-varied phenomena. We need not expect to see in it an obvious solution of this or that form of progress; because it is equally concerned with forms of progress bearing little apparent resemblance to them: its association with multiform orders of facts, involves its dissociation from any particular order of facts. Being that which determines progress of every kind—astronomic, geologic, organic, ethnologic, social, economic, artistic, &c.—it must be involved with some fundamental trait displayed in common by these; and must be expressible in terms of this fundamental trait. The only obvious respect in which all kinds of progress are alike, is, that they are modes of *change;* and hence, in some characteristic of changes in general, the desired solution will probably be found. We may suspect *a priori* that in some universal law of change lies the explanation of this universal transformation of the homogeneous into the heterogeneous.

Thus much premised, we pass at once to the statement of the law, which is this:—*Every active force produces more than one change—every cause produces more than one effect.*

To make this proposition comprehensible, a few examples must be given. When one body strikes another, that which we usually regard as the effect, is

a change of position or motion in one or both bodies. But a moment's thought shows us that this is a very incomplete view of the matter. Besides the visible mechanical result, sound is produced; or, to speak accurately, a vibration in one or both bodies, which is communicated to the surrounding air; and under some circumstances we call this the effect. Moreover, the air has not only been made to undulate, but has had currents caused in it by the transit of the bodies. Further, there is a disarrangement of the particles of the two bodies in the neighbourhood of their point of collision; amounting, in some cases, to a visible condensation. Yet more, this condensation is accompanied by the disengagement of heat. In some cases a spark—that is, light—results from the incandescence of a portion struck off; and sometimes this incandescence is associated with chemical combination. Thus, by the mechanical force expended in the collision, at least five, and often more, different kinds of changes have been produced. Take, again, the lighting of a candle. Primarily this is a chemical change consequent on a rise of temperature. The process of combination having once been started by extraneous heat, there is a continued formation of carbonic acid, water, &c.—in itself a result more complex than the extraneous heat that first caused it. But accompanying this process of combination there is a production of heat; there is a production of light; there is an ascending column of hot gases generated; there are inflowing currents set going in the surrounding air. Moreover, the complicating of effects does not end here: each of the several changes produced becomes the parent of further changes. The carbonic acid given off will by and by combine with some base; or under the influence of sunshine give up its carbon to the leaf of a plant. The water will modify the hygrometric state of the air around; or, if the current of hot gases containing it comes against a cold body, will be condensed: altering the temperature of the surface it covers. The heat given out melts the subjacent tallow, and expands whatever it warms. The light, falling on various substances, calls forth from them reactions by which its composition is modified; and so divers colours are produced. Similarly even with these secondary actions, which may be traced out into ever-multiplying ramifications, until they become too minute to be appreciated. And thus it is with all changes whatever. No case can be named in which an active force does not evolve forces of several kinds, and each of these, other groups of forces. Universally the effect is more complex than the cause.

Doubtless the reader already foresees the course of our argument. This multiplication of effects, which is displayed in every event of to-day, has been going on from the beginning; and is true of the grandest phenomena of the universe as of the most insignificant. From the law that every active force produces more than one change, it is an inevitable corollary that during the past there has been an ever-growing complication of things. Throughout creation there must have gone on, and must still go on, a never-ceasing transformation of the homogeneous into the heterogeneous. Let us trace this truth in detail.

Without committing ourselves to it as more than a speculation, though a highly probable one, let us again commence with the evolution of the Solar System out of a nebulous medium. The hypothesis is that from the mutual attraction of the molecules of a diffused mass whose form is unsymmetrical, there results not only condensation but rotation. While the condensation and the rate of rotation go on increasing, the approach of the molecules is necessarily accompanied by an increasing temperature. As the temperature rises, light begins to be evolved; and ultimately there results a revolving sphere of fluid matter radiating intense heat and light—a sun. There are reasons for believing

that, in consequence of the higher tangential velocity originally possessed by the outer parts of the condensing nebulous mass, there will be occasional detachments of rotating rings; and that, from the breaking up of these nebulous rings, there will arise masses which in the course of their condensation repeat the actions of the parent mass, and so produce planets and their satellites—an inference strongly supported by the still extant rings of Saturn. Should it hereafter be satisfactorily shown that planets and satellites were thus generated, a striking illustration will be afforded of the highly heterogeneous effects produced by the primary homogeneous cause; but it will serve our present purpose to point to the fact that from the mutual attraction of the particles of an irregular nebulous mass there result condensation, rotation, heat, and light.

It follows as a corollary from the Nebular Hypothesis, that the Earth must once have been incandescent; and whether the Nebular Hypothesis be true or not, this original incandescence of the Earth is now inductively established—or, if not established, at least rendered so highly probable that it is an accepted geological doctrine. Let us look first at the astronomical attributes of this once molten globe. From its rotation there result the oblateness of its form, the alternations of day and night, and (under the influence of the moon and in a smaller degree the sun) the tides, aqueous and atmospheric. From the inclination of its axis, there result the many differences of the seasons, both simultaneous and successive, that pervade its surface, and from the same cause joined with the action of the moon on the equatorial protuberance there results the precession of the equinoxes. Thus the multiplication of effects is obvious. Several of the differentiations due to the gradual cooling of the Earth have been already noticed —as the formation of a crust, the solidification of sublimed elements, the precipitation of water, &c.,—and we here again refer to them merely to point out that they are simultaneous effects of the one cause, diminishing heat. Let us now, however, observe the multiplied changes afterwards arising from the continuance of this one cause. The cooling of the Earth involves its contraction. Hence the solid crust first formed is presently too large for the shrinking nucleus; and as it cannot support itself, inevitably follows the nucleus. But a spheroidal envelope cannot sink down into contact with a smaller internal spheroid, without disruption: it must run into wrinkles as the rind of an apple does when the bulk of its interior decreases from evaporation. As the cooling progresses and the envelope thickens, the ridges consequent on these contractions will become greater, rising ultimately into hills and mountains; and the later systems of mountains thus produced will not only be higher, as we find them to be, but will be longer, as we also find them to be. Thus, leaving out of view other modifying forces, we see what immense heterogeneity of surface has arisen from the one cause, loss of heat—a heterogeneity which the telescope shows us to be paralleled on the face of Mars, and which in the moon too, where aqueous and atmospheric agencies have been absent, it reveals under a somewhat different form. But we have yet to notice another kind of heterogeneity of surface similarly and simultaneously caused. While the Earth's crust was still thin, the ridges produced by its contraction must not only have been small, but the spaces between these ridges must have rested with great evenness upon the subjacent liquid spheroid; and the water in those arctic and antarctic regions in which it first condensed, must have been evenly distributed. But as fast as the crust thickened and gained corresponding strength, the lines of fracture from time to time caused in it, must have occurred at greater distances apart; the intermediate surfaces must have followed the contracting nucleus with less uniformity;

and there must have resulted larger areas of land and water. If any one, after wrapping up an orange in tissue paper, and observing not only how small are the wrinkles, but how evenly the intervening spaces lie upon the surface of the orange, will then wrap it up in thick cartridge-paper, and note both the greater height of the ridges and the larger spaces throughout which the paper does not touch the orange, he will realize the fact that, as the Earth's solid envelope grew thicker, the areas of elevation and depression increased. In place of islands homogeneously dispersed amid an all-embracing sea, there must have gradually arisen heterogeneous arrangements of continent and ocean. Once more, this double change in the extent and in the elevation of the lands, involved yet another species of heterogeneity—that of coast-line. A tolerably even surface raised out of the ocean must have a simple, regular sea-margin; but a surface varied by table-lands and intersected by mountain-chains must, when raised out of the ocean, have an outline extremely irregular both in its leading features and in its details. Thus, multitudinous geological and geographical results are slowly brought about by this one cause—the contraction of the Earth.

When we pass from the agency termed igneous, to aqueous and atmospheric agencies, we see the like ever-growing complications of effects. The denuding actions of air and water, joined with those of changing temperature, have, from the beginning, been modifying every exposed surface. Oxidation, heat, wind, frost, rain, glaciers, rivers, tides, waves, have been unceasingly producing disintegration; varying in kind and amount according to local circumstances. Acting upon a tract of granite, they here work scarcely an appreciable effect; there cause exfoliations of the surface, and a resulting heap of *débris* and boulders; and elsewhere, after decomposing the feldspar into a white clay, carry away this and the accompanying quartz and mica, and deposit them in separate beds, fluviatile and marine. When the exposed land consists of several unlike kinds of sedimentary strata, or igneous rocks, or both, denudation produces changes proportionably more heterogeneous. The formations being disintegrable in different degrees, there follows an increased irregularity of surface. The areas drained by different rivers being differently constituted, these rivers carry down to the sea different combinations of ingredients; and so sundry new strata of unlike compositions are formed. And here we may see very simply illustrated, the truth, which we shall presently have to trace out in more involved cases, that in proportion to the heterogeneity of the object or objects on which any force expends itself, is the heterogeneity of the effects. A continent of complex structure, exposing many strata irregularly distributed, raised to various levels, tilted up at all angles, will, under the same denuding agencies, give origin to innumerable and involved results: each district must be differently modified; each river must carry down a different kind of detritus; each deposit must be differently distributed by the entangled currents, tidal and other, which wash the contorted shores; and this multiplication of results must manifestly be greatest where the complexity of surface is greatest.

Here we might show how the general truth, that every active force produces more than one change, is again exemplified in the highly-involved flow of the tides, in the ocean currents, in the winds, in the distribution of rain, in the distribution of heat, and so forth. But not to dwell upon these, let us, for the fuller elucidation of this truth in relation to the inorganic world, consider what would be the consequences of some extensive cosmical catastrophe—say the subsidence of Central America. The immediate results of the disturbance would themselves be sufficiently complex. Besides the numberless dislocations of strata, the ejections of igneous

matter, the propagation of earthquake vibrations thousands of miles around, the loud explosions, and the escape of gases; there would be the rush of the Atlantic and Pacific Oceans to fill the vacant space, the subsequent recoil of enormous waves, which would traverse both these oceans and produce myriads of changes along their shores, the corresponding atmospheric waves complicated by the currents surrounding each volcanic vent, and the electrical discharges with which such disturbances are accompanied. But these temporary effects would be insignificant compared with the permanent ones. The currents of the Atlantic and Pacific would be altered in their directions and amounts. The distribution of heat achieved by these ocean currents would be different from what it is. The arrangement of the isothermal lines, not only on neighbouring continents, but even throughout Europe, would be changed. The tides would flow differently from what they do now. There would be more or less modification of the winds in their periods, strengths, directions, qualities. Rain would fall scarcely anywhere at the same times and in the same quantities as at present. In short, the meteorological conditions thousands of miles off, on all sides, would be more or less revolutionized. Thus, without taking into account the infinitude of modifications which these changes would produce upon the flora and fauna, both of land and sea, the reader will perceive the immense heterogeneity of the results wrought out by one force, when that force expends itself upon a previously complicated area; and he will draw the corollary that from the beginning the complication has advanced at an increasing rate.

Before going on to show how organic progress also depends on the law that every force produces more than one change, we have to notice the manifestation of this law in yet another species of inorganic progress—namely, chemical. The same general causes that have wrought out the heterogeneity of the Earth, physically considered, have simultaneously wrought out its chemical heterogeneity. There is every reason to believe that at an extreme heat the elements cannot combine. Even under such heat as can be artificially produced, some very strong affinities yield, as, for instance, that of oxygen for hydrogen; and the great majority of chemical compounds are decomposed at much lower temperatures. But without insisting on the highly probable inference, that when the Earth was in its first state of incandescence there were no chemical combinations at all, it will suffice for our purpose to point to the unquestionable fact that the compounds which can exist at the highest temperatures, and which must, therefore, have been the first that were formed as the Earth cooled, are those of the simplest constitutions. The protoxides—including under that head the alkalies, earths, &c.—are, as a class, the most stable compounds we know: most of them resisting decomposition by any heat we can generate. These are combinations of the simplest order—are but one degree less homogeneous than the elements themselves. More heterogeneous, less stable, and therefore later in the Earth's history, are the deutoxides, tritoxides, peroxides, &c.; in which two, three, four, or more atoms of oxygen are united with one atom of metal or other element. Higher than these in heterogeneity are the hydrates; in which an oxide of hydrogen, united with an oxide of some other element, forms a substance whose atoms severally contain at least four ultimate atoms of three different kinds. Yet more heterogeneous and less stable still are the salts; which present us with molecules each made up of five, six, seven, eight, ten, twelve, or more atoms, of three, if not more, kinds. Then there are the hydrated salts, of a yet greater heterogeneity, which undergo partial decomposition at much lower temperatures. After them come the further complicated supersalts and double salts, having a stability again decreased;

and so throughout. Without entering into qualifications for which space fails, we believe no chemist will deny it to be a general law of these inorganic combinations that, *other things equal*, the stability decreases as the complexity increases. When we pass to the compounds of organic chemistry, we find this general law still further exemplified: we find much greater complexity and much less stability. A molecule of albumen, for instance, consists of 482 ultimate atoms of five different kinds. Fibrine, still more intricate in constitution, contains in each molecule, 298 atoms of carbon, 49 of nitrogen, 2 of sulphur, 228 of hydrogen, and 92 of oxygen—in all, 669 atoms; or, more strictly speaking, equivalents. And these two substances are so unstable as to decompose at quite ordinary temperatures; as that to which the outside of a joint of roast meat is exposed. Thus it is manifest that the present chemical heterogeneity of the Earth's surface has arisen by degrees, as the decrease of heat has permitted; and that it has shown itself in three forms—first, in the multiplication of chemical compounds; second, in the greater number of different elements contained in the more modern of these compounds: and third, in the higher and more varied multiples in which these more numerous elements combine.

To say that this advance in chemical heterogeneity is due to the one cause, diminution of the Earth's temperature, would be to say too much; for it is clear that aqueous and atmospheric agencies have been concerned; and further, that the affinities of the elements themselves are implied. The cause has all along been a composite one: the cooling of the Earth having been simply the most general of the concurrent causes, or assemblage of conditions. And here, indeed, it may be remarked that in the several classes of facts already dealt with (excepting, perhaps, the first), and still more in those with which we shall presently deal, the causes are more or less compound; as indeed are nearly all causes with which we are acquainted. Scarcely any change can rightly be ascribed to one agency alone, to the neglect of the permanent or temporary conditions under which only this agency produces the change. But as it does not materially affect our argument, we prefer, for simplicity's sake, to use throughout the popular mode of expression. Perhaps it will be further objected, that to assign loss of heat as the cause of any changes, is to attribute these changes not to a force, but to the absence of a force. And this is true. Strictly speaking, the changes should be attributed to those forces which come into action when the antagonist force is withdrawn. But though there is inaccuracy in saying that the freezing of water is due to the loss of its heat, no practical error arises from it; nor will a parallel laxity of expression vitiate our statements respecting the multiplication of effects. Indeed, the objection serves but to draw attention to the fact, that not only does the exertion of a force produce more than one change, but the withdrawal of a force produces more than one change.

Returning to the thread of our exposition, we have next to trace, throughout organic progress, this same all-pervading principle. And here, where the evolution of the homogeneous into the heterogeneous was first observed, the production of many effects by one cause is least easy to demonstrate. The development of a seed into a plant, or an ovum into an animal, is so gradual, while the forces which determine it are so involved, and at the same time so unobtrusive, that it is difficult to detect the multiplication of effects which is elsewhere so obvious. But, guided by indirect evidence, we may safely conclude that here too the law holds. Note, first, how numerous are the changes which any marked action works upon an adult organism—a human being, for instance. An alarming sound or sight, besides the impressions on the organs of sense and the nerves, may produce a start, a scream, a distortion of

the face, a trembling consequent on general muscular relaxation, a burst of perspiration, a rush of blood to the brain, followed possibly by arrest of the heart's action and by syncope; and if the subject be feeble, an indisposition with its long train of complicated symptoms may set in. Similarly in cases of disease. A minute portion of the small-pox virus introduced into the system, will, in a severe case, cause, during the first stage, rigors, heat of skin, accelerated pulse, furred tongue, loss of appetite, thirst, epigastric uneasiness, vomiting, headache, pains in the back and limbs, muscular weakness, convulsions, delirium, &c.; in the second stage, cutaneous eruption, itching, tingling, sore throat, swelled fauces, salivation, cough, hoarseness, dyspnœa, &c.; and in the third stage, œdematous inflammations, pneumonia, pleurisy, diarrhœa, inflammation of the brain, ophthalmia, erysipelas, &c.: each of which enumerated symptoms is itself more or less complex. Medicines, special foods, better air, might in like manner be instanced as producing multipled results. Now it needs only to consider that the many changes thus wrought by one force upon an adult organism, will be in part paralleled in an embryo organism, to understand how here also, the evolution of the homogeneous into the heterogeneous may be due to the production of many effects by one cause. The external heat, which, falling on a matter having special proclivities, determines the first complications of the germ, may, by acting on these, superinduce further complications; upon these still higher and more numerous ones; and so on continually: each organ as it is developed serving, by its actions and reactions on the rest, to initiate new complexities. The first pulsations of the fœtal heart must simultaneously aid the unfolding of every part. The growth of each tissue, by taking from the blood special proportions of elements, must modify the constitution of the blood; and so must modify the nutrition of all the other tissues. The heart's action, implying as it does a certain waste, necessitates an addition to the blood of effete matters, which must influence the rest of the system, and perhaps, as some think, cause the formation of excretory organs. The nervous connexions established among the viscera must further multiply their mutual influences; and so continually. Still stronger becomes the probability of this view when we call to mind the fact, that the same germ may be evolved into different forms according to circumstances. Thus, during its earlier stages, every embryo is sexless—becomes either male or female as the balance of forces acting on it determines. Again, it is a well-established fact that the larva of a working-bee will develop into a queen-bee, if, before it is too late, its food be changed to that on which the larvæ of queen-bees are fed. All which instances suggest that the proximate cause of each advance in embryonic complication is the action of incident forces upon the complication previously existing. Indeed, we may find *a priori* reason to think that the evolution proceeds after this manner. For since no germ, animal or vegetal, contains the slightest rudiment or indication of the future organism—since the microscope has shown us that the first process set up in every fertilized germ, is a process of repeated spontaneous fissions ending in the production of a mass of cells, not one of which exhibits any special character; there seems no alternative but to suppose that the partial organization at any moment existing in a growing embryo, is transformed by the agencies acting upon it into the succeeding phase of organization, and this into the next, until, through ever-increasing complexities, the ultimate form is reached. Not indeed that we can thus really explain the production of any plant or animal. We are still in the dark respecting those mysterious properties in virtue of which the germ, when subject to fit influences, undergoes the special

changes that begin the series of transformations. All we aim to show, is, that given a germ possessing those particular proclivities distinguishing the species to which it belongs, and the evolution of an organism from it, probably depends on that multiplication of effects which we have seen to be the cause of progress in general, so far as we have yet traced it.

When, leaving the development of single plants and animals, we pass to that of the Earth's flora and fauna, the course of our argument again becomes clear and simple. Though, as was admitted in the first part of this article, the fragmentary facts Paleontology has accumulated, do not clearly warrant us in saying that, in the lapse of geologic time, there have been evolved more heterogeneous organisms, and more heterogeneous assemblages of organisms, yet we shall now see that there *must* ever have been a tendency towards these results. We shall find that the production of many effects by one cause, which, as already shown, has been all along increasing the physical heterogeneity of the Earth, has further involved an increasing heterogeneity in its flora and fauna, individually and collectively. An illustration will make this clear. Suppose that by a series of upheavals, occurring, as they are now known to do, at long intervals, the East Indian Archipelago were to be, step by step, raised into a continent, and a chain of mountains formed along the axis of elevation. By the first of these upheavals, the plants and animals inhabiting Borneo, Sumatra, New Guinea, and the rest, would be subjected to slightly modified sets of conditions. The climate in general would be altered in temperature, in humidity, and in its periodical variations; while the local differences would be multiplied. These modifications would affect, perhaps inappreciably, the entire flora and fauna of the region. The change of level would produce additional modifications: varying in different species, and also in different members of the same species, according to their distance from the axis of elevation. Plants, growing only on the seashore in special localities, might become extinct. Others, living only in swamps of a certain humidity, would, if they survived at all, probably undergo visible changes of appearance. While still greater alterations would occur in the plants gradually spreading over the lands newly raised above the sea. The animals and insects living on these modified plants, would themselves be in some degree modified by change of food, as well as by change of climate; and the modification would be more marked where, from the dwindling or disappearance of one kind of plant, an allied kind was eaten. In the lapse of the many generations arising before the next upheaval, the sensible or insensible alterations thus produced in each species would become organized—there would be a more or less complete adaptation to the new conditions. The next upheaval would superinduce further organic changes, implying wider divergences from the primary forms; and so repeatedly. But now let it be observed that the revolution thus resulting would not be a substitution of a thousand more or less modified species for the thousand original species; but in place of the thousand original species there would arise several thousand species, or varieties, or changed forms. Each species being distributed over an area of some extent, and tending continually to colonize the new area exposed, its different members would be subject to different sets of changes. Plants and animals spreading towards the equator would not be affected in the same way as others spreading from it. Those spreading towards the new shores would undergo changes unlike the changes undergone by those spreading into the mountains. Thus, each original race of organisms, would become the root from which diverged several races differing more or less from it and from each other; and while some of these might subsequently disappear, probably more

than one would survive in the next geologic period: the very dispersion itself increasing the chances of survival. Not only would there be certain modifications thus caused by change of physical conditions and food, but also in some cases other modifications caused by change of habit. The fauna of each island, peopling, step by step, the newly-raised tracts, would eventually come in contact with the faunas of other islands; and some members of these other faunas would be unlike any creatures before seen. Herbivores meeting with new beasts of prey, would, in some cases, be led into modes of defence or escape differing from those previously used; and simultaneously the beasts of prey would modify their modes of pursuit and attack. We know that when circumstances demand it, such changes of habit *do* take place in animals; and we know that if the new habits become the dominant ones, they must eventually in some degree alter the organization. Observe now, however, a further consequence. There must arise not simply a tendency towards the differentiation of each race of organisms into several races; but also a tendency to the occasional production of a somewhat higher organism. Taken in the mass these divergent varieties which have been caused by fresh physical conditions and habits of life, will exhibit changes quite indefinite in kind and degree; and changes that do not necessarily constitute an advance. Probably in most cases the modified type will be neither more nor less heterogeneous than the original one. In some cases the habits of life adopted being simpler than before, a less heterogeneous structure will result: there will be a retrogradation. But it *must* now and then occur, that some division of a species, falling into circumstances which give it rather more complex experiences, and demand actions somewhat more involved, will have certain of its organs further differentiated in proportionately small degrees,—will become slightly more heterogeneous. Thus, in the natural course of things, there will from time to time arise an increased heterogeneity both of the Earth's flora and fauna, and of individual races included in them. Omitting detailed explanations, and allowing for the qualifications which cannot here be specified, we think it is clear that geological mutations have all along tended to complicate the forms of life, whether regarded separately or collectively. The same causes which have led to the evolution of the Earth's crust from the simple into the complex, have simultaneously led to a parallel evolution of the Life upon its surface. In this case, as in previous ones, we see that the transformation of the homogeneous into the heterogeneous is consequent upon the universal principle, that every active force produces more than one change.

The deduction here drawn from the established truths of geology and the general laws of life, gains immensely in weight on finding it to be in harmony with an induction drawn from direct experience. Just that divergence of many races from one race, which we inferred must have been continually occurring during geologic time, we know to have occurred during the pre-historic and historic periods, in man and domestic animals. And just that multiplication of effects which we concluded must have produced the first, we see has produced the last. Single causes, as famine, pressure of population, war, have periodically led to further dispersions of mankind and of dependent creatures: each such dispersion initiating new modifications, new varieties of type. Whether all the human races be or be not derived from one stock, philology makes it clear that whole groups of races now easily distinguishable from each other, were originally one race,—that the diffusion of one race into different climates and conditions of existence, has produced many modified forms of it. Similarly with domestic animals. Though in some cases—as

that of dogs—community of origin will perhaps be disputed, yet in other cases —as that of the sheep or the cattle of our own country—it will not be questioned that local differences of climate, food, and treatment, have transformed one original breed into numerous breeds now become so far distinct as to produce unstable hybrids. Moreover, through the complication of effects flowing from single causes, we here find, what we before inferred, not only an increase of general heterogeneity, but also of special heterogeneity. While of the divergent divisions and subdivisions of the human race many have undergone changes not constituting an advance; while in some the type may have degraded; in others it has become decidedly more heterogeneous. The civilized European departs more widely from the vertebrate archetype than does the savage. Thus, both the law and the cause of progress, which, from lack of evidence, can be but hypothetically substantiated in respect of the earlier forms of life on our globe, can be actually substantiated in respect of the latest forms.[1]

If the advance of Man towards greater heterogeneity is traceable to the production of many effects by one cause, still more clearly may the advance of Society towards greater heterogeneity be so explained. Consider the growth of an industrial organization. When, as must occasionally happen, some member of a tribe displays unusual aptitude for making an article of general use—a weapon, for instance—which was before made by each man for himself, there arises a tendency towards the differentiation of that member into a maker of such weapon. His companions—warriors and hunters all of them,—severally feel the importance of having the best weapons that can be made; and are therefore certain to offer strong inducements to this skilled individual to make weapons for them. He, on the other hand, having not only an unusual faculty, but an unusual liking, for making such weapons (the talent and the desire for any occupation being commonly associated), is predisposed to fulfil each commission on the offer of an adequate reward: especially as his love of distinction is also gratified and his living facilitated. This first specialization of function, once commenced, tends ever to become more decided. On the side of the weapon-maker practice gives increased skill—increased superiority to his products. On the side of his clients, cessation of practice entails decreased skill. Thus the influences which determine this division of labour grow stronger in both ways: and the incipient heterogeneity is, on the average of cases, likely to become permanent for that generation if no longer. This process not only differentiates the social mass into two parts, the one monopolizing, or almost monopolizing, the performance of a certain function, and the other losing the habit, and in some measure the power, of performing that function; but it tends to initiate other differentiations. The advance described implies the introduction of barter,—the maker of weapons has, on each occasion, to be paid in such other articles as he agrees

[1] The argument concerning organic evolution contained in this paragraph and the one preceding it, stands verbatim as it did when first published in the *Westminster Review* for April, 1857. I have thus left it without the alteration of a word that it may show the view I then held concerning the origin of species. The sole cause recognized is that of direct adaptation of constitution to conditions consequent on inheritance of the modifications of structure resulting from use and disuse. There is no recognition of that further cause disclosed in Mr. Darwin's work, published two and a half years later—the indirect adaptation resulting from the natural selection of favourable variations. The multiplication of effects is, however, equally illustrated in whatever way the adaptation to changing conditions is effected, or if it is effected in both ways, as I hold. I may add that there is indicated the view that the succession of organic forms is not serial but proceeds by perpetual divergence and re-divergence—that there has been a continual "divergence of many races from one race"; each species being a "root" from which several other species branch out; and the growth of a tree being thus the implied symbol.

to take in exchange. He will not habitually take in exchange one kind of article, but many kinds. He does not want mats only, or skins, or fishing-gear, but he wants all these, and on each occasion will bargain for the particular things he most needs. What follows? If among his fellows there exist any slight differences of skill in the manufacture of these various things, as there are almost sure to do, the weapon-maker will take from each one the thing which that one excels in making: he will exchange for mats with him whose mats are superior, and will bargain for the fishing-gear of him who has the best. But he who has bartered away his mats or his fishing-gear, must make other mats or fishing-gear for himself; and in so doing must, in some degree, further develop his aptitude. Thus it results that the small specialities of faculty possessed by various members of the tribe, will tend to grow more decided. And whether or not there ensue distinct differentiations of other individuals into makers of particular articles, it is clear that incipient differentiations take place throughout the tribe: the one original cause produces not only the first dual effect, but a number of secondary dual effects, like in kind, but minor in degree. This process, of which traces may be seen among schoolboys, cannot well produce lasting effects in an unsettled tribe; but where there grows up a fixed and multiplying community, such differentiations become permanent, and increase with each generation. The enhanced demand for every commodity, intensifies the functional activity of each specialized person or class; and this renders the specialization more definite where it already exists, and establishes it where it is but nascent. By increasing the pressure on the means of subsistence, a larger population again augments these results; seeing that each person is forced more and more to confine himself to that which he can do best, and by which he can gain most. Presently, under these same stimuli, new occupations arise. Competent workers, ever aiming to produce improved articles, occasionally discover better processes or raw materials. The substitution of bronze for stone entails on him who first makes it a great increase of demand; so that he or his successor eventually finds all his time occupied in making the bronze for the articles he sells, and is obliged to depute the fashioning of these articles to others; and, eventually, the making of bronze, thus differentiated from a pre-existing occupation, becomes an occupation by itself. But now mark the ramified changes which follow this change. Bronze presently replaces stone, not only in the articles it was first used for, but in many others—in arms, tools, and utensils of various kinds: and so affects the manufacture of them. Further, it affects the processes which these utensils subserve, and the resulting products,—modifies buildings, carvings, personal decorations. Yet again, it sets going manufactures which were before impossible, from lack of a material fit for the requisite implements. And all these changes react on the people—increase their manipulative skill, their intelligence, their comfort,—refine their habits and tastes. Thus the evolution of a homogeneous society into a heterogeneous one, is clearly consequent on the general principle, that many effects are produced by one cause.

Space permitting, we might show how the localization of special industries in special parts of a kingdom, as well as the minute subdivision of labour in the making of each commodity, are similarly determined. Or, turning to a somewhat different order of illustrations, we might dwell on the multitudinous changes—material, intellectual, moral—caused by printing; or the further extensive series of changes wrought by gunpowder. But leaving the intermediate phases of social development, let us take a few illustrations from its most recent and its passing phases. To trace the effects of steam-power, in its manifold applications to mining, navigation, and manufactures of

all kinds, would carry us into unmanageable detail. Let us confine ourselves to the latest embodiment of steam power—the locomotive engine. This, as the proximate cause of our railway system, has changed the face of the country, the course of trade, and the habits of the people. Consider, first, the complicated sets of changes that precede the making of every railway—the provisional arrangements, the meetings, the registration, the trial section, the parliamentary survey, the lithographed plans, the books of reference, the local deposits and notices, the application to Parliament, the passing Standing Orders Committee, the first, second, and third readings: each of which brief heads indicates a multiplicity of transactions, and the extra development of sundry occupations—as those of engineers, surveyors, lithographers, parliamentary agents, sharebrokers; and the creation of sundry others—as those of traffic takers, reference-takers. Consider, next, the yet more marked changes implied in railway construction—the cuttings, embankings, tunnelings, diversions of roads; the building of bridges and stations, the laying down of ballast, sleepers, and rails; the making of engines, tenders, carriages, and waggons: which processes, acting on numerous trades, increase the importation of timber, the quarrying of stone, the manufacture of iron, the mining of coal, the burning of bricks; institute a variety of special manufactures weekly advertised in the *Railway Times*; and, finally, open the way to sundry new occupations, as those of drivers, stokers, cleaners, plate-layers, &c., &c. And then consider the changes, still more numerous and involved, which railways in action produce on the community at large. Business agencies are established where previously they would not have paid; goods are obtained from remote wholesale houses instead of near retail ones; and commodities are used which distance once rendered inaccessible. Again, the diminished cost of carriage tends to specialize more than ever the industries of different districts—to confine each manufacture to the parts in which, from local advantages, it can be best carried on. Further, the fall in freights, facilitating distribution, equalizes prices, and also, on the average, lowers prices: thus bringing divers articles within the means of those before unable to buy them, and so increasing their comforts and improving their habits. At the same time the practice of travelling is immensely extended. People who never before dreamed of it, take trips to the sea; visit their distant relations; make tours; and so we are benefited in body, feelings, and ideas. The more prompt transmission of letters and of news produces other marked changes—makes the pulse of the nation faster. Once more, there arises a wide dissemination of cheap literature through railway book-stalls, and of advertisements in railway carriages: both of them aiding ulterior progress. And the countless changes here briefly indicated are consequent on the invention of the locomotive engine. The social organism has been rendered more heterogeneous in virtue of the many new occupations introduced, and the many old ones further specialized; prices of nearly all things in every place have been altered; each trader has modified his way of doing business; and every person has been affected in his actions, thoughts, emotions.

Illustrations to the same effect might be indefinitely accumulated, but they are needless. The only further fact demanding notice, is, that we here see still more clearly the truth before pointed out, that in proportion as the area on which any force expends itself becomes heterogeneous, the results are in a yet higher degree multiplied in number and kind. While among the simple tribes to whom it was first known, caoutchouc caused but few changes, among ourselves the changes have been so many and varied that the history of them occupies a volume.[1] Upon the small, homo-

[1] "Personal Narrative of the Origin of the

geneous community inhabiting one of the Hebrides, the electric telegraph would produce, were it used, scarcely any results; but in England the results it produces are multitudinous. The comparatively simple organization under which our ancestors lived five centuries ago, could have undergone but few modifications from an event like the recent one at Canton; but now, the legislative decision respecting it sets up many hundreds of complex modifications, each of which will be the parent of numerous future ones.

Space permitting, we could willingly have pursued the argument in relation to all the subtler results of civilization. As before we showed that the law of progress to which the organic and inorganic worlds conform, is also conformed to by Language, the plastic arts, Music, &c.; so might we here show that the cause which we have hitherto found to determine progress holds in these cases also. Instances might be given proving how, in Science, an advance of one division presently advances other divisions—how Astronomy has been immensely forwarded by discoveries in Optics, while other optical discoveries have initiated Microscopic Anatomy, and greatly aided the growth of Physiology—how Chemistry has indirectly increased our knowledge of Electricity, Magnetism, Biology, Geology—how Electricity has reacted on Chemistry and Magnetism, and has developed our views of Light and Heat. In Literature the same truth might be exhibited in the manifold effects of the primitive mystery-play, as originating the modern drama, which has variously branched; or in the still multiplying forms of periodical literature which have descended from the first newspaper, and which have severally acted and reacted on other forms of literature and on each other. The influence which a new school of Painting—as that of the pre-Raffaelites—exercises upon other schools; the hints which all kinds of pictorial art are deriving from Photography; the complex results of new critical doctrines, as those of Mr. Ruskin, might severally be dwelt upon as displaying the like multiplication of effects.

But we venture to think our case is already made out. The imperfections of statement which brevity has necessitated, do not, we believe, invalidate the propositions laid down. The qualifications here and there demanded would not, if made, affect the inferences. Though, in tracing the genesis of progress, we have frequently spoken of complex causes as if they were simple ones; it still remains true that such causes are far less complex than their results. Detailed criticisms do not affect our main position. Endless facts go to show that every kind of progress is from the homogeneous to the heterogeneous; and that it is so because each change is followed by many changes. And it is significant that where the facts are most accessible and abundant, there these truths are most manifest.

However, to avoid committing ourselves to more than is yet proved, we must be content with saying that such are the law and the cause of all progress that is known to us. Should the Nebular Hypothesis ever be established, then it will become manifest that the Universe at large, like every organism, was once homogeneous; that as a whole, and in every detail, it has unceasingly advanced towards greater heterogeneity. It will be seen that as in each event of to-day, so from the beginning, the decomposition of every expended force into several forces has been perpetually producing a higher complication; that the increase of heterogeneity so brought about is still going on and must continue to go on; and that thus progress is not an accident, not a thing within human control, but a beneficent necessity.

A few words must be added on the ontological bearings of our argument.

Caoutchouc, or India-Rubber Manufacture in England." By Thomas Hancock.

Probably not a few will conclude that here is an attempted solution of the great questions with which Philosophy in all ages has perplexed itself. Let none thus deceive themselves. After all that has been said, the ultimate mystery remains just as it was. The explanation of that which is explicable, does but bring out into greater clearness the inexplicableness of that which remains behind. Little as it seems to do so, fearless inquiry tends continually to give a firmer basis to all true Religion. The timid sectarian, obliged to abandon one by one the superstitions bequeathed to him, and daily finding his cherished beliefs more and more shaken, secretly fears that all things may some day be explained; and has a corresponding dread of Science: thus evincing the profoundest of all infidelity—the fear lest the truth be bad. On the other hand, the sincere man of science, content to follow wherever the evidence leads him, becomes by each new inquiry more profoundly convinced that the Universe is an insoluble problem. Alike in the external and the internal worlds, he sees himself in the midst of ceaseless changes, of which he can discover neither beginning nor end. If, tracing back the evolution of things, he allows himself to entertain the hypothesis that all matter once existed in a diffused form, he finds it impossible to conceive how this came to be so; and equally, if he speculates on the future, he can assign no limit to the grand succession of phenomena ever unfolding themselves before him. Similarly, if he looks inward, he perceives that both terminations of the thread of consciousness are beyond his grasp: he cannot remember when or how consciousness commenced, and he cannot examine the consciousness at any moment existing; for only a state of consciousness which is already past can become the object of thought, and never one which is passing. When, again, he turns from the succession of phenomena, external or internal, to their essential nature, he is equally at fault. Though he may succeed in resolving all properties of objects into manifestations of force, he is not thereby enabled to conceive what force is; but finds, on the contrary, that the more he thinks about it, the more he is baffled. Similarly, though analysis of mental actions may finally bring him down to sensations as the original materials out of which all thought is woven, he is none the forwarder; for he cannot in the least comprehend sensation. Inward and outward things he thus discovers to be alike inscrutable in their ultimate genesis and nature. He sees that the Materialist and Spiritualist controversy is a mere war of words; the disputants being equally absurd—each believing he understands that which it is impossible for any man to understand. In all directions his investigations eventually bring him face to face with the unknowable; and he ever more clearly perceives it to be the unknowable. He learns at once the greatness and the littleness of human intellect—its power in dealing with all that comes within the range of experience; its impotence in dealing with all that transcends experience. He feels more vividly than any others can feel, the utter incomprehensibleness of the simplest fact, considered in itself. He alone truly *sees* that absolute knowledge is impossible. He alone *knows* that under all things there lies an impenetrable mystery.

THE DEVELOPMENT HYPOTHESIS

(1852)

In a debate upon the Development Hypothesis, lately narrated to me by a friend, one of the disputants was described as arguing that as, in all our experience, we know no such phenomena as transmutation of species, it is unphilosophical to assume that transmutation of species ever takes place. Had I been present, I think that, passing over his assertion, which is open to criticism, I should have replied that, as in all our experience we have never known a species *created*, it was, by his own showing, unphilosophical to assume that any species ever had been created.

Those who cavalierly reject the Theory of Evolution as not being adequately supported by facts, seem to forget that their own theory is supported by no facts at all. Like the majority of men who are born to a given belief, they demand the most rigorous proof of any adverse belief, but assume that their own needs none. Here we find, scattered over the globe, vegetable and animal organisms numbering, of the one kind (according to Humboldt), some 320,000 species, and of the other, some 2,000,000 species (see Carpenter); and if to these we add the numbers of animal and vegetable species which have become extinct, we may safely estimate the number of species that have existed, and are existing, on the Earth, at not less than *ten millions*. Well, which is the most rational theory about these ten millions of species? Is it most likely that there have been ten millions of special creations? or is it most likely that, by continual modifications due to change of circumstances, ten millions of varieties have been produced, as varieties are being produced still?

Doubtless many will reply that they can more easily conceive ten millions of special creations to have taken place, than they can conceive that ten millions of varieties have arisen by successive modifications. All such, however, will find, on inquiry, that they are under an illusion. This is one of the many cases in which men do not really believe, but rather *believe they believe*. It is not that they can truly conceive ten millions of special creations to have taken place, but that they *think they can do so*. Careful introspection will show them that they have never yet realized to themselves the creation of even *one* species. If they have formed a definite conception of the process, let them tell us how a new species is constructed, and how it makes its appearance. Is it thrown down from the clouds? or must we hold to the notion that it struggles up out of the ground? Do its limbs and viscera rush together from all the points of the compass? or must we receive the old Hebrew idea, that God takes clay and moulds a new creature? If they say that a new creature is produced in none of these modes, which are too absurd to be believed, then they are required to describe the mode in which a new creature *may* be produced—a mode which does *not* seem absurd; and such a mode they will find that they neither have conceived nor can conceive.

Should the believers in special creations consider it unfair thus to call upon them to describe how special creations take place, I reply that this is far less than they demand from the supporters of the Development Hypothesis. They are merely asked to point out a *conceivable* mode. On the other hand, they ask, not simply for a *conceivable* mode, but for the *actual* mode. They do not say—Show us how this *may* take place; but they say—Show us how this *does* take place. So far from its being unreasonable to put the above question,

it would be reasonable to ask not only for a *possible* mode of special creation, but for an *ascertained* mode; seeing that this is no greater a demand than they make upon their opponents.

And here we may perceive how much more defensible the new doctrine is than the old one. Even could the supporters of the Development Hypothesis merely show that the origination of species by the process of modification is conceivable, they would be in a better position than their opponents. But they can do much more than this. They can show that the process of modification has effected, and is effecting, decided changes in all organisms subject to modifying influences. Though, from the impossibility of getting at a sufficiency of facts, they are unable to trace the many phases through which any existing species has passed in arriving at its present form, or to identify the influences which caused the successive modifications; yet, they can show that any existing species—animal or vegetable—when placed under conditions different from its previous ones, *immediately begins to undergo certain changes fitting it for the new conditions.* They can show that in successive generations these changes continue; until, ultimately, the new conditions become the natural ones. They can show that in cultivated plants, in domesticated animals, and in the several races of men, such alterations have taken place. They can show that the degrees of difference so produced are often, as in dogs, greater than those on which distinctions of species are in other cases founded. They can show that it is a matter of dispute whether some of these modified forms are varieties or separate species. They can show, too, that the changes daily taking place in ourselves—the facility that attends long practice, and the loss of aptitude that begins when practice ceases—the strengthening of passions habitually gratified, and the weakening of those habitually curbed—the development of every faculty, bodily, moral, or intellectual, according to the use made of it—are all explicable on this same principle. And thus they can show that throughout all organic nature there *is* at work a modifying influence of the kind they assign as the cause of these specific differences: an influence which, though slow in its action, does, in time, if the circumstances demand it, produce marked changes—an influence which, to all appearance, would produce in the millions of years, and under the great varieties of condition which geological records imply, any amount of change.

Which, then, is the most rational hypothesis?—that of special creations, which has neither a fact to support it nor is even definitely conceivable; or that of modification, which is not only definitely conceivable, but is countenanced by the habitudes of every existing organism?

That by any series of changes a protozoon should ever become a mammal, seems to those who are not familiar with zoology, and who have not seen how clear becomes the relationship between the simplest and the most complex forms when intermediate forms are examined, a very grotesque notion. Habitually, looking at things rather in their statical aspect than in their dynamical aspect, they never realize the fact that, by small increments of modification, any amount of modification may in time be generated. That surprise which they feel on finding one whom they last saw as a boy, grown into a man, becomes incredulity when the degree of change is greater. Nevertheless, abundant instances are at hand of the mode in which we may pass to the most diverse forms by insensible gradations. Arguing the matter some time since with a learned professor, I illustrated my position thus:—You admit that there is no apparent relationship between a circle and an hyperbola. The one is a finite curve; the other is an infinite one. All parts of the one are alike; of the other no parts are alike [save parts on its opposite sides]. The

one incloses a space; the other will not inclose a space though produced for ever. Yet opposite as are these curves in all their properties, they may be connected together by a series of intermediate curves, no one of which differs from the adjacent ones in any appreciable degree. Thus, if a cone be cut by a plane at right angles to its axis we get a circle. If, instead of being perfectly at right angles, the plane subtends with the axis an angle of 89° 59′, we have an ellipse which no human eye, even when aided by an accurate pair of compasses, can distinguish from a circle. Decreasing the angle minute by minute, the ellipse becomes first perceptibly eccentric, then manifestly so, and by and by acquires so immensely elongated a form, as to bear no recognizable resemblance to a circle. By continuing this process, the ellipse passes insensibly into a parabola; and, ultimately, by still further diminishing the angle, into an hyperbola. Now here we have four different species of curve—circle, ellipse, parabola, and hyperbola—each having its peculiar properties and its separate equation, and the first and last of which are quite opposite in nature, connected together as members of one series, all producible by a single process of insensible modification.

But the blindness of those who think it absurd to suppose that complex organic forms may have arisen by successive modifications out of simple ones, becomes astonishing when we remember that complex organic forms are daily being thus produced. A tree differs from a seed immeasurably in every respect—in bulk, in structure, in colour, in form, in chemical composition: differs so greatly that no visible resemblance of any kind can be pointed out between them. Yet is the one changed in the course of a few years into the other: changed so gradually, that at no moment can it be said—Now the seed ceases to be, and the tree exists. What can be more widely contrasted than a newly-born child and the small, semi-transparent spherule constituting the human ovum? The infant is so complex in structure that a cyclopædia is needed to describe its constituent parts. The germinal vesicle is so simple that it may be defined in a line. Nevertheless a few months suffice to develop the one out of the other; and that, too, by a series of modifications so small, that were the embryo examined at successive minutes, even a microscope would with difficulty disclose any sensible changes. That the uneducated and the ill-educated should think the hypothesis that all races of beings, man inclusive, may in process of time have been evolved from the simplest monad, a ludicrous one, is not to be wondered at. But for the physiologist, who knows that every individual being *is* so evolved—who knows, further, that in their earliest condition the germs of all plants and animals whatever are so similar, "that there is no appreciable distinction amongst them, which would enable it to be determined whether a particular molecule is the germ of a Conferva or of an Oak, of a Zoophyte or of a Man";[1]—for him to make a difficulty of the matter is inexcusable. Surely if a single cell may, when subjected to certain influences, become a man in the space of twenty years; there is nothing absurd in the hypothesis that under certain other influences, a cell may, in the course of millions of years, give origin to the human race.

We have, indeed, in the part taken by many scientific men in this controversy of "Law *versus* Miracle," a good illustration of the tenacious vitality of superstitions. Ask one of our leading geologists or physiologists whether he believes in the Mosaic account of the creation, and he will take the question as next to an insult. Either he rejects the narrative entirely, or understands it in some

[1] Carpenter, *Principles of Comparative Physiology*, p. 474.

vague non-natural sense. Yet one part of it he unconsciously adopts; and that, too, literally. For whence has he got this notion of "special creations," which he thinks so reasonable, and fights for so vigorously? Evidently he can trace it back to no other source than this myth which he repudiates. He has not a single fact in nature to cite in proof of it; nor is he prepared with any chain of reasoning by which it may be established. Catechize him, and he will be forced to confess that the notion was put into his mind in childhood as part of a story which he now thinks absurd. And why, after rejecting all the rest of the story, he should strenuously defend this last remnant of it, as though he had received it on valid authority, he would be puzzled to say.

THE GENESIS OF SCIENCE

(1854)

There still prevails among men a vague notion that scientific knowledge differs in nature from ordinary knowledge. By the Greeks, with whom Mathematics—literally *things learnt*—was alone considered as knowledge proper, the distinction must have been strongly felt; and it has ever since maintained itself in the general mind. Though, considering the contrast between the achievements of science and those of daily unmethodic thinking, it is not surprising that such a distinction has been assumed; yet it needs but to rise a little above the common point of view, to see that it is but a superficial distinction. The same faculties are employed in both cases; and in both cases their mode of operation is fundamentally the same. If we say that science is organized knowledge, we are met by the truth that all knowledge is organized in a greater or less degree—that the commonest actions of the household and the field presuppose facts colligated, inferences drawn, results expected; and that the general success of these actions proves the data by which they were guided to have been correctly put together. If, again, we say that science is prevision—is a seeing beforehand—is a knowing in what times, places, combinations, or sequences, specified phenomena will be found; we are obliged to confess that the definition includes much that is foreign to science in its ordinary acceptation: for example, a child's knowledge of an apple. This, as far as it goes, consists in previsions. When a child sees a certain form and colours, it knows that if it puts out its hand it will have certain impressions of resistance, and roundness, and smoothness; and if it bites, a certain taste. And manifestly its general acquaintance with surrounding objects is of like nature—is made up of facts concerning them, grouped so that any part of a group being perceived, the existence of the other facts included in it is foreseen. If, once more, we say that science is *exact* prevision, we still fail to establish the supposed difference. Not only do we find that much of what we call science is not exact, and that some of it, as physiology, can never become exact; but we find further, that many of the previsions constituting the common stock alike of wise and foolish, *are* exact. That an unsupported body will fall; that a lighted candle will go out when immersed in water; that ice will melt when thrown on the fire—these, and many like predictions relating to the familiar properties of things, have as high a degree of accuracy as predictions are capable of. It is true that the results foreseen are of a very general character; but it is none the less true that they are

correct as far as they go; and this is all that is requisite to fulfil the definition. There is perfect accordance between the anticipated phenomena and the actual ones; and no more than this can be said of the highest achievements of the sciences specially characterized as exact.

Seeing thus that the assumed distinction between scientific knowledge and common knowledge cannot be sustained; and yet feeling, as we must, that however impossible it may be to draw a line between them, the two are not practically identical; there arises the question —What is the relationship between them? A partial answer to this question may be drawn from the illustrations just given. On reconsidering them, it will be observed that those portions of ordinary knowledge which are identical in character with scientific knowledge, comprehend only such combinations of phenomena as are directly cognizable by the senses, and are of simple, invariable nature. That the smoke from a fire which she is lighting will ascend, and that the fire will presently boil the water placed over it, are previsions which the servant-girl makes equally well with the most learned physicist; but they are previsions concerning phenomena in constant and direct relation—phenomena that follow visibly and immediately after their antecedents—phenomena of which the causation is neither remote nor obscure—phenomena which may be predicted by the simplest possible act of reasoning. If, now, we pass to the previsions constituting science—that an eclipse of the moon will happen at a specified time; that when a barometer is taken to the top of a mountain of known height, the mercurial column will descend a stated number of inches; that the poles of a galvanic battery immersed in water will give off, the one an inflammable and the other an inflaming gas, in definite ratio—we perceive that the relations involved are not of a kind habitually presented to our senses. They depend, some of them, on special combinations of causes; and in some of them the connexion between antecedents and consequents is established only by an elaborate series of inferences. A broad distinction, therefore, between scientific knowledge and common knowledge is its remoteness from perception. If we regard the cases in their most general aspect, we see that the labourer who, on hearing certain notes in the adjacent hedge, can describe the particular form and colours of the bird making them, and the astronomer who, having calculated a transit of Venus, can delineate the black spot entering on the sun's disc, as it will appear through the telescope, at a specified hour, do essentially the same thing. Each knows that on fulfilling the requisite conditions, he shall have a preconceived impression—that after a definite series of actions will come a group of sensations of a foreknown kind. The difference, then, is neither in the fundamental character of the mental acts; nor in the correctness of the previsions accomplished by them; but in the complexity of the processes required to achieve the previsions. Much of our common knowledge is, as far as it goes, precise. Science does not increase its precision. What then does it do? It reduces other knowledge to the same degree of precision. That certainty which direct perception gives us respecting coexistences and sequences of the simplest and most accessible kind, science gives us respecting coexistences and sequences, complex in their dependencies, or inaccessible to immediate observation. In brief, regarded from this point of view, science may be called *an extension of the perceptions by means of reasoning.*

On further considering the matter, however, it will perhaps be felt that this definition does not express the whole fact—that inseparable as science may be from common knowledge, and completely as we may fill up the gap between the simplest previsions of the child and the most recondite ones of the physicist, by interposing a series of previsions in which the complexity of reasoning

involved is greater and greater, there is yet a difference between the two beyond that above described. And this is true. But the difference is still not such as enables us to draw the assumed line of demarcation. It is a difference not between common knowledge and scientific knowledge; but between the successive phases of science itself, or knowledge itself—whichever we choose to call it. In its earlier phases science attains only to *certainty* of foresight; in its later phases it further attains to *completeness*. We begin by discovering *a* relation; we end by discovering *the* relation. Our first achievement is to foretell the *kind* of phenomenon which will occur under specified conditions; our last achievement is to foretell not only the kind but the *amount*. Or, to reduce the proposition to its most definite form—undeveloped science is *qualitative* prevision; developed science is *quantitative* prevision.

This will at once be perceived to express the remaining distinction between the lower and the higher stages of positive knowledge. The prediction that a piece of lead will take more force to lift it than a piece of wood of equal size, exhibits certainty, but not completeness, of foresight. The kind of effect in which the one body will exceed the other is foreseen; but not the amount by which it will exceed. There is qualitative prevision only. On the other hand, the predictions that at a stated time two particular planets will be in conjunction; that by means of a lever having arms in a given ratio, a known force will raise just so many pounds; that to decompose a given quantity of sulphate of iron by carbonate of soda will require so many grains—these predictions show foreknowledge, not only of the nature of the effects to be produced, but of the magnitude, either of the effects themselves, of the agencies producing them, or of the distance in time or space at which they will be produced. There is both qualitative prevision and quantitative prevision. And this is the unexpressed difference which leads us to consider certain orders of knowledge as especially scientific when contrasted with knowledge in general. Are the phenomena *measurable?* is the test which we unconsciously employ. Space is measurable: hence Geometry. Force and space are measurable: hence Statics. Time, force, and space are measurable: hence Dynamics. The invention of the barometer enabled men to extend the principles of mechanics to the atmosphere; and Aerostatics existed. When a thermometer was devised there arose a science of heat which was before impossible. Of such external agents as we have found no measures but our sensations we have no sciences. We have no science of smells; nor have we one of tastes. We have a science of the relations of sounds differing in pitch, because we have discovered a way to measure these relations; but we have no science of sounds in respect to their loudness or their *timbre*, because we have got no measures of loudness and *timbre*. Obviously it is this reduction of the sensible phenomena it presents, to relations of magnitude, which gives to any division of knowledge its specially scientific character. Originally men's knowledge of weights and forces was like their present knowledge of smells and tastes—a knowledge not extending beyond that given by the unaided sensations; and it remained so until weighing instruments and dynamometers were invented. Before there were hour-glasses and clepsydras, most phenomena could be estimated as to their durations and intervals, with no greater precision than degrees of hardness can be estimated by the fingers. Until a thermometric scale was contrived, men's judgments respecting relative amounts of heat stood on the same footing with their present judgments respecting relative amounts of sound. And as in these initial stages, with no aids to observation, only the roughest comparisons of cases could be made, and only the most marked differences perceived, it resulted that only the most

simple laws of dependence could be ascertained—only those laws which, being uncomplicated with others, and not disturbed in their manifestations, required no niceties of observation to disentangle them. Whence it appears not only that in proportion as knowledge becomes quantitative do its provisions become complete as well as certain, but that until its assumption of a quantitative character it is necessarily confined to the most elementary relations.

Moreover it is to be remarked that while, on the one hand, we can discover the laws of the greater part of phenomena only by investigating them quantitatively; on the other hand we can extend the range of our quantitative previsions only as fast as we detect the laws of the results we predict. For clearly the ability to specify the magnitude of a result inaccessible to direct measurement, implies knowledge of its mode of dependence on something which can be measured—implies that we know the particular fact dealt with to be an instance of some more general fact. Thus the extent to which our quantitative previsions have been carried in any direction, indicates the depth to which our knowledge reaches in that direction. And here, as another aspect of the same fact, it may be observed that as we pass from qualitative to quantitative prevision, we pass from inductive science to deductive science. Science while purely inductive is purely qualitative; when inaccurately quantitative it usually consists of part induction, part deduction; and it becomes accurately quantitative only when wholly deductive. We do not mean that the deductive and the quantitative are coextensive; for there is manifestly much deduction that is qualitative only. We mean that all quantitative prevision is reached deductively; and that induction can achieve only qualitative prevision.

Still, however, it must not be supposed that these distinctions enable us to separate ordinary knowledge from science; much as they seem to do so. While they show in what consists the broad contrast between the extreme forms of the two, they yet lead us to recognize their essential identity, and once more prove the difference to be one of degree only. For, on the one hand, much of our common knowledge is to some extent quantitative; seeing that the amount of the foreseen result is known within certain wide limits. And, on the other hand, the highest quantitative prevision does not reach the exact truth, but only a near approach to it. Without clocks the savage knows that the day is longer in the summer than in the winter; without scales he knows that stone is heavier than flesh; that is, he can foresee respecting certain results that their amounts will exceed these, and be less than those—he knows *about* what they will be. And, with his most delicate instruments and most elaborate calculations, all that the man of science can do, is to reduce the difference between the foreseen and the actual results to an unimportant quantity. Moreover, it must be borne in mind not only that all the sciences are qualitative in their first stages,—not only that some of them, as Chemistry, have but lately reached the quantitative stage—but that the most advanced sciences have attained to their present power of determining quantities not present to the senses, or not directly measurable, by a slow process of improvement extending through thousands of years. So that science and the knowledge of the uncultured are alike in the nature of their previsions, widely as they differ in range; they possess a common imperfection, though this is immensely greater in the last than in the first; and the transition from the one to the other has been through a series of steps by which the imperfection has been rendered continually less, and the range continually wider.

These facts, that science and ordinary knowledge are allied in nature, and that the one is but a perfected and extended form of the other, must necessarily underlie the whole theory of science, its progress, and the relations of its parts to

each other. There must be incompleteness in any history of the sciences, which, leaving out of view the first steps of their genesis, commences with them only when they assume definite forms. There must be grave defects, if not a general untruth, in a philosophy of the sciences considered in their interdependence and development, which neglects the inquiry how they came to be distinct sciences, and how they were severally evolved out of the chaos of primitive ideas. Not only a direct consideration of the matter, but all analogy, goes to show that in the earlier and simpler stages must be sought the key to all subsequent intricacies. The time was when the anatomy and physiology of the human being were studied by themselves—when the adult man was analyzed and the relations of parts and of functions investigated, without reference either to the relations exhibited in the embryo or to the homologous relations existing in other creatures. Now, however, it has become manifest that no true conceptions are possible under such conditions. Anatomists and physiologists find that the real natures of organs and tissues can be ascertained only by tracing their early evolution; and that the affinities between existing genera can be satisfactorily made out only by examining the fossil genera to which they are akin. Well, is it not clear that the like must be true concerning all things that undergo development? Is not science a growth? Has not science, too, its embryology? And must not the neglect of its embryology lead to a misunderstanding of the principles of its evolution and of its existing organization?

There are *a priori* reasons, therefore, for doubting the truth of all philosophies of the sciences which tacitly proceed upon the common notion that scientific knowledge and ordinary knowledge are separate; instead of commencing, as they should, by affiliating the one upon the other, and showing how it gradually came to be distinguishable from the other. We may expect to find their generalizations essentially artificial; and we shall not be deceived. Some illustrations of this may here be fitly introduced, by way of preliminary to a brief sketch of the genesis of science from the point of view indicated. And we cannot more readily find such illustrations than by glancing at a few of the various *classifications* of the sciences that have from time to time been proposed. To consider all of them would take too much space: we must content ourselves with some of the latest.

Commencing with those which may be soonest disposed of, let us notice, first, the arrangement propounded by Oken. An abstract of it runs thus:—

Part I. MATHESIS.—*Pneumatogeny:* Primary Act, Primary Consciousness, God, Primary Rest, Time, Polarity, Motion, Man, Space, Point, Line, Surface, Globe, Rotation.—*Hylogeny:* Gravity, Matter, Ether, Heavenly Bodies, Light, Heat, Fire.

(He explains that MATHESIS is the doctrine of the whole; *Pneumatogeny* being the doctrine of immaterial totalities, and *Hylogeny* that of material totalities.)

Part II. ONTOLOGY.—*Cosmogeny:* Rest, Centre, Motion, Line, Planets, Form, Planetary System, Comets.—*Stöchiogeny:* Condensation, Simple Matter, Elements, Air, Water, Earth.—*Stöchiology:* Functions of the Elements, &c., &c.—*Kingdoms of Nature:* Individuals.

(He says in explanation that "ONTOLOGY teaches us the phenomena of matter. The first of these are the heavenly bodies comprehended by *Cosmogeny*. These divide into elements—*Stöchiogeny*. The earth element divides into minerals—*Mineralogy*. These unite into one collective body—*Geogeny*. The whole in singulars is the living, or *Organic*, which again divides into plants and animals. *Biology*, therefore, divides into *Organogeny*, *Phytosophy*, *Zoosophy*.")

FIRST KINGDOM.—MINERALS. *Mineralogy*, *Geology*.

Part III. BIOLOGY.—*Organosophy*, *Phytogeny*, *Phyto-physiology*, *Phytology*, *Zoogeny*, *Physiology*, *Zoology*, *Psychology*.

A glance over this confused scheme shows that it is an attempt to classify knowledge, not after the order in which

it has been, or may be, built up in the human consciousness; but after an assumed order of creation. It is a pseudo-scientific cosmogony, akin to those which men have enunciated from the earliest times downwards; and only a little more respectable. As such it will not be thought worthy of much consideration by those who, like ourselves, hold that experience is the sole origin of knowledge. Otherwise, it might have been needful to dwell on the incongruities of the arrangement—to ask how motion can be treated of before space? how there can be rotation without matter to rotate? how polarity can be dealt with without involving points and lines? But it will serve our present purpose just to indicate a few of the absurdities resulting from the doctrine which Oken seems to hold in common with Hegel, that "to philosophize on Nature is to re-think the great thought of Creation." Here is a sample:—

"Mathematics is the universal science; so also is Physio-philosophy, although it is only a part, or rather but a condition of the universe; both are one, or mutually congruent.

"Mathematics is, however, a science of mere forms without substance. Physio-philosophy is, therefore, *mathematics endowed with substance.*"

From the English point of view it is sufficiently amusing to find such a dogma not only gravely stated, but stated as an unquestionable truth. Here we see the experiences of quantitative relations which men have gathered from surrounding bodies and generalized (experiences which had been scarcely at all generalized at the beginning of the historic period)—we find these generalized experiences, these intellectual abstractions, elevated into concrete actualities, projected back into Nature, and considered as the internal frame-work of things—the skeleton by which matter is sustained. But this new form of the old realism, is by no means the most startling of the physio-philosophic principles. We presently read that,

"The highest mathematical idea, or the fundamental principle of all mathematics is the zero = o." * * *

"Zero is in itself nothing. Mathematics is based upon nothing, and, *consequently*, arises out of nothing.

"Out of nothing, *therefore*, it is possible for something to arise; for mathematics, consisting of propositions, is a something in relation to o."

By such "consequentlys" and "therefores" it is, that men philosophize when they "re-think the great thought of Creation." By dogmas that pretend to be reasons, nothing is made to generate mathematics; and by clothing mathematics with matter, we have the universe! If now we deny, as we *do* deny, that the highest mathematical idea is the zero—if, on the other hand, we assert, as we *do* assert, that the fundamental idea underlying all mathematics, is that of equality; the whole of Oken's cosmogony disappears. And here, indeed, we may see illustrated, the distinctive peculiarity of the German method of procedure in these matters—the bastard *a priori* method, as it may be termed. The legitimate *a priori* method sets out with propositions of which the negation is inconceivable; the *a priori* method as illegitimately applied, sets out either with propositions of which the negation is *not* inconceivable, or with propositions like Oken's, of which the *affirmation* is inconceivable.

It is needless to proceed further with the analysis; else might we detail the steps by which Oken arrives at the conclusions that "the planets are coagulated colours, for they are coagulated light"; that "the sphere is the expanded nothing"; that gravity is "a weighty nothing, a heavy essence, striving towards a centre"; that "the earth is the identical, water the indifferent, air the different; or the first the centre, the second the radius, the last the periphery of the general globe or of fire." To comment on them would be nearly as absurd as are the propositions themselves. Let us pass on to another of

the German systems of knowledge—that of Hegel.

The simple fact that Hegel puts Jacob Bœhme on a par with Bacon, suffices alone to show that his stand-point is far remote from the one usually regarded as scientific: so far remote, indeed, that it is not easy to find any common basis on which to found a criticism. Those who hold that the mind is moulded into conformity with surrounding things by the agency of surrounding things, are necessarily at a loss how to deal with those who, like Schelling and Hegel, assert that surrounding things are solidified mind—that Nature is "petrified intelligence." However, let us briefly glance at Hegel's classification. He divides philosophy into three parts:—

1. *Logic*, or the science of the idea in itself, the pure idea.

2. *The Philosophy of Nature*, or the science of the idea considered under its other form—of the idea as Nature.

3. *The Philosophy of the Mind*, or the science of the idea in its return to itself.

Of these, the second is divided into the natural sciences, commonly so-called; so that in its more detailed form the series runs thus:—Logic, Mechanics, Physics, Organic Physics, Psychology.

Now, if we believe with Hegel, first, that thought is the true essence of man; second, that thought is the essence of the world; and that, therefore, there is nothing but thought; his classification, beginning with the science of pure thought, may be acceptable. But otherwise, it is an obvious objection to his arrangement, that thought implies things thought of—that there can be no logical forms without the substance of experience—that the science of ideas and the science of things must have a simultaneous origin. Hegel, however, anticipates this objection, and, in his obstinate idealism, replies, that the contrary is true. He affirms that all contained in the forms, to become something, requires to be thought; and that logical forms are the foundations of all things.

It is not surprising that, starting from such premises, and reasoning after this fashion, Hegel finds his way to strange conclusions. Out of *space* and *time* he proceeds to build up *motion*, *matter*, *repulsion*, *attraction*, *weight*, and *inertia*. He then goes on to logically evolve the solar system. In doing this he widely diverges from the Newtonian theory; reaches by syllogism the conviction that the planets are the most perfect celestial bodies; and, not being able to bring the stars within his theory, says that they are mere formal existences and not living matter, and that as compared with the solar system they are as little admirable as a cutaneous eruption or a swarm of flies.[1] Results so absurd might be left as self-disproved, were it not that speculators of this class are not alarmed by any amount of incongruity with established beliefs. The only efficient mode of treating systems like this of Hegel, is to show that they are self-destructive—that by their first steps they ignore that authority on which all their subsequent steps depend. If Hegel professes, as he manifestly does, to develop his scheme by reasoning—if he presents successive inferences as *necessarily following* from certain premises; he implies the postulate that a belief which necessarily follows after certain antecedents is a true belief; and did an opponent reply to one of his inferences that, though it was impossible to think the opposite, yet the opposite was true, he would consider the reply irrational. The procedure, however, which he would thus condemn as destructive of all thinking whatever, is just the procedure exhibited in the enunciation of his own first principles. Mankind find themselves unable to conceive that there can be thought without things thought of. Hegel, however, asserts that there *can* be thought without things thought of. That ultimate test of a true proposition—the inability of the human mind to conceive the negation of it—

[1] It is curious that the author of "The Plurality of Worlds," with quite other aims, should have persuaded himself into similar conclusions.

which in all the successive steps of his arguments he considers valid, he considers invalid where it suits his convenience to do so; and yet at the same time denies the right of an opponent to follow his example. If it is competent for him to posit dogmas which are the direct negations of what human consciousness recognizes; then is it also competent for his antagonists to stop him at any moment by saying, that though the particular inference he is drawing seems to his mind, and to all minds, necessarily to follow from the premises, yet it is not true, but the contrary inference is true. Or, to state the dilemma in another form:—If he sets out with inconceivable propositions, then may he with equal propriety make all his succeeding propositions inconceivable ones—may at every step throughout his reasoning draw the opposite conclusion to that which seems involved.

Hegel's mode of procedure being thus essentially suicidal, the Hegelian classification which depends upon it, falls to the ground. Let us consider next that of M. Comte.

As all his readers must admit, M. Comte presents us with a scheme of the sciences which, unlike the foregoing ones, demands respectful consideration. Widely as we differ from him, we cheerfully bear witness to the largeness of his views, the clearness of his reasoning, and the value of his speculations as contributing to intellectual progress. Did we believe a serial arrangement of the sciences to be possible, that of M. Comte would certainly be the one we should adopt. His fundamental propositions are thoroughly intelligible; and, if not true, have a great semblance of truth. His successive steps are logically coordinated; and he supports his conclusions by a considerable amount of evidence—evidence which, so long as it is not critically examined, or not met by counter evidence, seems to substantiate his positions. But it only needs to assume that antagonistic attitude which *ought* to be assumed towards new doctrines, in the belief that, if true, they will prosper by conquering objectors—it needs but to test his leading doctrines either by other facts than those he cites, or by his own facts differently applied, to show that they will not stand. We will proceed thus to deal with the general principle on which he bases his hierarchy of the sciences.

In the condensed translation of the *Positive Philosophy*, by Miss Martineau, M. Comte says:—"Our problem is, then, to find the one *rational* order, amongst a host of possible systems."...... "This order is determined by the degree of simplicity, or, what comes to the same thing, of generality of their phenomena." And the arrangement he deduces runs thus:—*Mathematics*, *Astronomy*, *Physics*, *Chemistry*, *Physiology*, *Social Physics*. This he asserts to be "the true *filiation* of the sciences." He asserts further, that the principle of progression from a greater to a less degree of generality, "which gives this order to the whole body of science, arranges the parts of each science." And, finally, he asserts that the gradations thus established *a priori* among the sciences and the parts of each science, "is in essential conformity with the order which has spontaneously taken place among the branches of natural philosophy"; or, in other words—corresponds with the order of historic development.

Let us compare these assertions with the facts. That there may be perfect fairness, let us make no choice, but take as the field for our comparison, the succeeding section treating of the first science—Mathematics; and let us use none but M. Comte's own facts, and his own admissions. Confining ourselves to this one science, we are limited to comparisons between its several parts. M. Comte says, that the parts of each science must be arranged in the order of their decreasing generality; and that this order of decreasing generality agrees with the order of historic development. Our inquiry will be, then, whether the history of mathematics confirms this statement.

Carrying out his principle, M. Comte divides Mathematics into "Abstract Mathematics, or the Calculus (taking the word in its most extended sense) and Concrete Mathematics, which is composed of General Geometry and of Rational Mechanics." The subject-matter of the first of these is *number;* the subject-matter of the second includes *space, time, motion, force.* The one possesses the highest possible degree of generality; for all things whatever admit of enumeration. The others are less general; seeing that there are endless phenomena that are not cognizable either by general geometry or rational mechanics. In conformity with the alleged law, therefore, the evolution of the calculus must throughout have preceded the evolution of the concrete sub-sciences. Now somewhat awkwardly for him, the first remark M. Comte makes bearing on this point is, that "from an historical point of view, mathematical analysis *appears to have arisen out of* the contemplation of geometrical and mechanical facts." True, he goes on to say that, "it is not the less independent of these sciences logically speaking;" for that "analytical ideas are, above all others, universal, abstract, and simple; and geometrical conceptions are necessarily founded on them." We will not take advantage of this last passage to charge M. Comte with teaching, after the fashion of Hegel, that there can be thought without things thought of. We are content simply to compare the assertion, that analysis arose out of the contemplation of geometrical and mechanical facts, with the assertion that geometrical conceptions are founded upon analytical ones. Literally interpreted they exactly cancel each other. Interpreted, however, in a liberal sense, they imply, what we believe to be demonstrable, that the two had *a simultaneous origin.* The passage is either nonsense, or it is an admission that abstract and concrete mathematics are coeval. Thus, at the very first step, the alleged congruity between the order of generality and the order of evolution, does not hold good.

But may it not be that though abstract and concrete mathematics took their rise at the same time, the one afterwards developed more rapidly than the other; and has ever since remained in advance of it? No: and again we call M. Comte himself as witness. Fortunately for his argument he has said nothing respecting the early stages of the concrete and abstract divisions after their divergence from a common root; otherwise the advent of Algebra long after the Greek geometry had reached a high development, would have been an inconvenient fact for him to deal with. But passing over this, and limiting ourselves to his own statements, we find, at the opening of the next chapter, the admission, that "the historical development of the abstract portion of mathematical science has, since the time of Descartes, been for the most part *determined* by that of the concrete." Further on we read respecting algebraic functions that "most functions were concrete in their origin—even those which are at present the most purely abstract; and the ancients discovered only through geometrical definitions elementary algebraic properties of functions to which a numerical value was not attached till long afterwards, rendering abstract to us what was concrete to the old geometers." How do these statements tally with his doctrine? Again, having divided the calculus into algebraic and arithmetical, M. Comte admits, as perforce he must, that the algebraic is more general than the arithmetical; yet he will not say that algebra preceded arithmetic in point of time. And again, having divided the calculus of functions into the calculus of direct functions (common algebra) and the calculus of indirect functions (transcendental analysis), he is obliged to speak of this last as possessing a higher generality than the first; yet it is far more modern. Indeed, by implication M. Comte himself confesses this incongruity; for he says:—"It might seem that the transcendental analysis ought to be studied before the ordinary, as it

provides the equations which the other has to resolve. But though the transcendental *is logically independent of the ordinary*, it is best to follow the usual method of study, taking the ordinary first." In all these cases, then, as well as at the close of the section where he predicts that mathematicians will in time "create procedures of *a wider generality*," M. Comte makes admissions that are diametrically opposed to the alleged law.

In the succeeding chapters treating of the concrete department of mathematics, we find similar contradictions. M. Comte himself names the geometry of the ancients *special* geometry, and that of the moderns *general* geometry. He admits that while "the ancients studied geometry with reference to the *bodies* under notice, or specially; the moderns study it with reference to the *phenomena* to be considered, or generally." He admits that while "the ancients extracted all they could out of one line or surface before passing to another," "the moderns, since Descartes, employ themselves on questions which relate to any figure whatever." These facts are the reverse of what, according to his theory, they should be. So, too, in mechanics. Before dividing it into statics and dynamics, M. Comte treats of the three laws of *motion*, and is obliged to do so; for statics, the more *general* of the two divisions, though it does not involve motion, is impossible as a science until the laws of motion are ascertained. Yet the laws of motion pertain to dynamics, the more *special* of the divisions. Further on he points out that after Archimedes, who discovered the law of equilibrium of the lever, statics made no progress until the establishment of dynamics enabled us to seek "the conditions of equilibrium through the laws of the composition of forces." And he adds—"At this day *this is the method universally employed.* At the first glance it does not appear the most rational—dynamics being more complicated than statics, and precedence being natural to the simpler. It would, in fact, be more philosophical to refer dynamics to statics, as has since been done." Sundry discoveries are afterwards detailed, showing how completely the development of statics has been achieved by considering its problems dynamically; and before the close of the section M. Comte remarks that "before hydrostatics could be comprehended under statics, it was necessary that the abstract theory of equilibrium should be made so general as to apply directly to fluids as well as solids. This was accomplished when Lagrange supplied, as the basis of the whole of rational mechanics, the single principle of virtual velocities." In which statement we have two facts directly at variance with M. Comte's doctrine;—first, that the simpler science, statics, reached its present development only by the aid of the principle of virtual velocities, which belongs to the more complex science, dynamics; and that this "single principle" underlying all rational mechanics—this *most general form* which includes alike the relations of statical, hydrostatical, and dynamical forces—was reached so late as the time of Lagrange.

Thus it is *not* true that the historical succession of the divisions of mathematics has corresponded with the order of decreasing generality. It is *not* true that abstract mathematics was evolved antecedently to, and independently of, concrete mathematics. It is *not* true that of the sub-divisions of abstract mathematics, the more general came before the more special. And it is *not* true that concrete mathematics, in either of its two sections, began with the most abstract and advanced to the less abstract truths.

It may be well to mention, parenthetically, that, in defending his alleged law of progression from the general to the special, M. Comte somewhere comments upon the two meanings of the word *general*, and the resulting liability to confusion. Without now discussing whether the asserted distinction exists in other cases, it is manifest that it does not exist

here. In sundry of the instances above quoted, the endeavours made by M. Comte himself to disguise, or to explain away, the precedence of the special over the general, clearly indicate that the generality spoken of is of the kind meant by his formula. And it needs but a brief consideration of the matter to show that, even did he attempt it, he could not distinguish this generality which, as above proved, frequently comes last, from the generality which he says always comes first. For what is the nature of that mental process by which objects, dimensions, weights, times, and the rest, are found capable of having their relations expressed numerically? It is the formation of certain abstract conceptions of unity, duality, and multiplicity, which are applicable to all things alike. It is the invention of general symbols serving to express the numerical relations of entities, whatever be their special characters. And what is the nature of the mental process by which numbers are found capable of having their relations expressed algebraically? It is the same. It is the formation of certain abstract conceptions of numerical functions which are constant whatever be the magnitudes of the numbers. It is the invention of general symbols serving to express the relations between numbers, as numbers express the relations between things. Just as arithmetic deals with the common properties of lines, areas, bulks, forces, periods; so does algebra deal with the common properties of the numbers which arithmetic presents.

Having shown that M. Comte's alleged law of progression does not hold among the several parts of the same science, let us see how it agrees with the facts when applied to the separate sciences. "Astronomy," says M. Comte (*Positive Philosophy*, Book III.), "was a positive science, in its geometrical aspect, from the earliest days of the school of Alexandria; but Physics, which we are now to consider, had no positive character at all till Galileo made his great discoveries on the fall of heavy bodies." On this, our comment is simply that it is a misrepresentation based upon an arbitrary misuse of words—a mere verbal artifice. By choosing to exclude from terrestrial physics those laws of magnitude, motion, and position, which he includes in celestial physics, M. Comte makes it appear that the last owes nothing to the first. Not only is this unwarrantable, but it is radically inconsistent with his own scheme of divisions. At the outset he says—and as the point is important we quote from the original—"Pour la *physique inorganique* nous voyons d'abord, en nous conformant toujours à l'ordre de généralité et de dépendance des phénomènes, qu'elle doit être partagée en deux sections distinctes, suivant qu'elle considère les phénomènes généraux de l'univers, ou, en particulier, ceux que présentent les corps terrestres. D'où la physique céleste, ou l'astronomie, soit géométrique, soit mechanique; et la physique terrestre." Here then we have *inorganic physics* clearly divided into *celestial physics* and *terrestrial physics*—the phenomena presented by the universe, and the phenomena presented by earthly bodies. If now celestial bodies and terrestrial bodies exhibit sundry leading phenomena in common, as they do, how can the generalization of these common phenomena be considered as pertaining to the one class rather than to the other? If inorganic physics includes geometry (which M. Comte has made it do by comprehending *geometrical* astronomy in its sub-section, celestial physics); and if its other sub-section, terrestrial physics, treats of things having geometrical properties; how can the laws of geometrical relations be excluded from terrestrial physics? Clearly, if celestial physics includes the geometry of objects in the heavens, terrestrial physics includes the geometry of objects on the earth. And if terrestrial physics includes terrestrial geometry, while celestial physics includes celestial geometry, then the geometrical part of terrestrial physics precedes the geometrical part of celestial physics; seeing that geometry gained its first

ideas from surrounding objects. Until men had learnt geometrical relations from bodies on the earth, it was impossible for them to understand the geometrical relations of bodies in the heavens. So, too, with celestial mechanics, which had terrestrial mechanics for its parent. The very conception of *force*, which underlies the whole of mechanical astronomy, is borrowed from our earthly experiences; and the leading laws of mechanical action as exhibited in scales, levers, projectiles, &c., had to be ascertained before the dynamics of the Solar System could be entered upon. What were the laws made use of by Newton in working out his grand discovery? The law of falling bodies disclosed by Galileo; that of the composition of forces also disclosed by Galileo; and that of centrifugal force found out by Huyghens—all of them generalizations of terrestrial physics. Yet, with facts like these before him, M. Comte places astronomy before physics in order of evolution! He does not compare the geometrical parts of the two together, and the mechanical parts of the two together; for this would by no means suit his hypothesis. But he compares the geometrical part of the one with the mechanical part of the other, and so gives a semblance of truth to his position. He is led away by a verbal illusion. Had he confined his attention to the things and disregarded the words, he would have seen that before mankind scientifically co-ordinated *any one class of phenomena* displayed in the heavens, they had previously co-ordinated *a parallel class of phenomena* displayed on the surface of the earth.

Were it needful we could fill a score pages with the incongruities of M. Comte's scheme. But the foregoing samples will suffice. So far is his law of evolution of the sciences from being tenable, that, by following his example, and arbitrarily ignoring one class of facts, it would be possible to present, with great plausibility, just the opposite generalization to that which he enunciates. While he asserts that the rational order of the sciences, like the order of their historic development, "is determined by the degree of simplicity, or, what comes to the same thing, of generality of their phenomena;" it might contrariwise be asserted that, commencing with the complex and the special, mankind have progressed step by step to a knowledge of greater simplicity and wider generality. So much evidence is there of this as to have drawn from Whewell, in his *History of the Inductive Sciences*, the remark that "the reader has already seen repeatedly in the course of this history, complex and derivative principles presenting themselves to men's minds before simple and elementary ones." Even from M. Comte's own work, numerous facts, admissions, and arguments, might be picked out, tending to show this. We have already quoted his words in proof that both abstract and concrete mathematics have progressed towards a higher degree of generality, and that he looks forward to a higher generality still. Just to strengthen this adverse hypothesis, let us take a further instance. From the *particular* case of the scales, the law of equilibrium of which was familiar to the earliest nations known, Archimedes advanced to the more *general* case of the lever of which the arms may or may not be equal; the law of equilibrium of which *includes* that of the scales. By the help of Galileo's discovery concerning the composition of forces, D'Alembert "established, for the first time, the equations of equilibrium of *any* system of forces applied to the different points of a solid body"—equations which include all cases of levers and an infinity of cases besides. Clearly this is progress towards a higher generality—towards a knowledge more independent of special circumstances—towards a study of phenomena "the most disengaged from the incidents of particular cases;" which is M. Comte's definition of "the most simple phenomena." Does it not indeed follow from the admitted fact, that

mental advance is from the concrete to the abstract, from the particular to the general, that the universal and therefore most simple truths are the last to be discovered? Should we ever succeed in reducing all orders of phenomena to some single law—say of atomic action, as M. Comte suggests—must not that law answer to his test of being *independent* of all others, and therefore most simple? And would not such a law generalize the phenomena of gravity, cohesion, atomic affinity, and electric repulsion, just as the laws of number generalize the quantitative phenomena of space, time and force?

The possibility of saying so much in support of an hypothesis the very reverse of M. Comte's, at once proves that his generalization is only a half-truth. The fact is that neither proposition is correct by itself; and the actuality is expressed only by putting the two together. The progress of science is duplex. It is at once from the special to the general, and from the general to the special. It is analytical and synthetical at the same time.

M. Comte himself observes that the evolution of science has been accomplished by the division of labour; but he quite misstates the mode in which this division of labour has operated. As he describes it, it has been simply an arrangement of phenomena into classes, and the study of each class by itself. He does not recognize the effect of progress in each class upon *all* other classes: he recognizes only the effect on the class succeeding it in his hierarchical scale. Or if he occasionally admits collateral influences and intercommunications, he does it so grudgingly, and so quickly puts the admissions out of sight and forgets them, as to leave the impression that, with but trifling exceptions, the sciences aid one another only in the order of their alleged succession. The fact is, however, that the division of labour in science, like the division of labour in society, and like the "physiological division of labour" in individual organisms, has been not only a specialization of functions, but a continuous helping of each division by all the others, and of all by each. Every particular class of inquirers has, as it were, secreted its own particular order of truths from the general mass of material which observation accumulates; and all other classes of inquirers have made use of these truths as fast as they were elaborated, with the effect of enabling them the better to elaborate each its own order of truths. It was thus in sundry of the cases we have quoted as at variance with M. Comte's doctrine. It was thus with the application of Huyghens's optical discovery to astronomical observation by Galileo. It was thus with the application of the isochronism of the pendulum to the making of instruments for measuring intervals, astronomical and other. It was thus when the discovery that the refraction and dispersion of light did not follow the same law of variation, affected both astronomy and physiology by giving us achromatic telescopes and microscopes. It was thus when Bradley's discovery of the aberration of light enabled him to make the first step towards ascertaining the motions of the stars. It was thus when Cavendish's torsion-balance experiment determined the specific gravity of the Earth, and so gave a datum for calculating the specific gravities of the Sun and Planets. It was thus when tables of atmospheric refraction enabled observers to write down the real places of the heavenly bodies instead of their apparent places. It was thus when the discovery of the different expansibilities of metals by heat gave us the means of correcting our chronometrical measurements of astronomical periods. It was thus when the lines of the prismatic spectrum were used to distinguish the heavenly bodies that are of like nature with the sun from those which are not. It was thus when, as recently, an electro-telegraphic instrument was invented for the more accurate registration of meridional transits. It was thus when the difference in the

rates of a clock at the equator, and nearer the poles, gave data for calculating the oblateness of the earth, and accounting for the precession of the equinoxes. It was thus—but it is needless to continue. Here, within our own limited knowledge of its history, we have named ten additional cases in which the single science of astronomy has owed its advance to sciences coming *after* it in M. Comte's series. Not only its minor changes, but its greatest revolutions have been thus determined. Kepler could not have discovered his celebrated laws had it not been for Tycho Brahe's accurate observations; and it was only after some progress in physical and chemical science that the improved instruments with which those observations were made, became possible. The heliocentric theory of the Solar System had to wait until the invention of the telescope before it could be finally established. Nay, even the grand discovery of all—the law of gravitation—depended for its proof upon an operation of physical science, the measurement of a degree on the Earth's surface. So completely, indeed, did it thus depend, that Newton ***had actually abandoned his hypothesis*** because the length of a degree, as then stated, brought out wrong results; and it was only after Picart's more exact measurement was published, that he returned to his calculations and proved his great generalization. Now this constant intercommunion which, for brevity's sake, we have illustrated in the case of one science only, has been taking place with all the sciences. Throughout the whole course of their evolution there has been a continuous *consensus* of the sciences—a *consensus* exhibiting a general correspondence with the *consensus* of the faculties in each phase of mental development; the one being an objective registry of the subjective state of the other.

From our present point of view, then, it becomes obvious that the conception of a *serial* arrangement of the sciences is a vicious one. It is not simply that, as M. Comte admits, such a classification "will always involve something, if not arbitrary, at least artificial;" it is not, as he would have us believe, that, neglecting minor imperfections, such a classification may be substantially true; but it is that any grouping of the sciences in a succession gives a radically erroneous idea of their genesis and their dependencies. There is no "one *rational* order among a host of possible systems." There is no "true *filiation* of the sciences." The whole hypothesis is fundamentally false. Indeed, it needs but a glance at its origin to see at once how baseless it is. Why a *series?* What reason have we to suppose that the sciences admit of a *linear* arrangement? Where is our warrant for assuming that there is some *succession* in which they can be placed? There is no reason; no warrant. Whence then has arisen the supposition? To use M. Comte's own phraseology, we should say, it is a metaphysical conception. It adds another to the cases constantly occurring, of the human mind being made the measure of Nature. We are obliged to think in sequence; it is a law of our minds that we must consider subjects separately, one after another: *therefore* Nature must be serial—*therefore* the sciences must be classifiable in a succession. See here the birth of the notion, and the sole evidence of its truth. Men have been obliged, when arranging in books their schemes of education and systems of knowledge, to choose *some* order or other. And from inquiring what is the best order, have fallen into the belief that there is an order which truly represents the facts—have persevered in seeking such an order; quite overlooking the previous question whether it is likely that Nature has consulted the convenience of book-making. For German philosophers, who hold that Nature is "petrified intelligence," and that logical forms are the foundations of all things, it is a consistent hypothesis that as thought is serial, Nature is serial; but that M. Comte, who is so bitter an

opponent of all anthropomorphism, even in its most evanescent shapes, should have committed the mistake of imposing upon the external world an arrangement which so obviously springs from a limitation of the human consciousness, is somewhat strange. And it is the more strange when we call to mind how, at the outset, M. Comte remarks that in the beginning "*toutes les sciences sont cultivées simultanément par les mêmes esprits*"; that this is "*inévitable et même indispensable*"; and how he further remarks that the different sciences are "*comme les diverses branches d'un tronc unique.*" Were it not accounted for by the distorting influence of a cherished hypothesis, it would be scarcely possible to understand how, after recognizing truths like these, M. Comte should have persisted in attempting to construct "*une échelle encyclopédique.*"

The metaphor which M. Comte has here so inconsistently used to express the relations of the sciences—branches of one trunk—is an approximation to the truth, though not the truth itself. It suggests the facts that the sciences had a common origin; that they have been developing simultaneously; and that they have been from time to time dividing and sub-dividing. But it fails to suggest the fact, that the divisions and sub-divisions thus arising do not remain separate, but now and again re-unite in direct and indirect ways. They inosculate; they severally send off and receive connecting growths; and the intercommunion has been ever becoming more frequent, more intricate, more widely ramified. There has all along been higher specialization, that there might be a larger generalization; and a deeper analysis, that there might be a better synthesis. Each larger generalization has lifted sundry specializations still higher; and each better synthesis has prepared the way for still deeper analysis.

And here we may fitly enter upon the task awhile since indicated—a sketch of the Genesis of Science, regarded as a gradual outgrowth from common knowledge—an extension of the perceptions by the aid of the reason. We propose to treat it as a psychological process historically displayed; tracing at the same time the advance from qualitative to quantitative prevision; the progress from concrete facts to abstract facts, and the application of such abstract facts to the analysis of new orders of concrete facts; the simultaneous advance in generalization and specialization; the continually increasing subdivision and reunion of the sciences; and their constantly improving *consensus.*

To trace out scientific evolution from its deepest roots would, of course, involve a complete analysis of the mind. For as science is a development of that common knowledge acquired by the unaided senses and uncultured reason, so is that common knowledge itself gradually built up out of the simplest perceptions. We must, therefore, begin somewhere abruptly; and the most appropriate stage to take for our point of departure will be the adult mind of the savage.

Commencing thus, without a proper preliminary analysis, we are naturally somewhat at a loss how to present, in a satisfactory manner, those fundamental processes of thought out of which science originates. Perhaps our argument may be best initiated by the proposition, that all intelligent action whatever depends upon the discerning of distinctions among surrounding things. The condition under which only it is possible for any creature to obtain food and avoid danger, is, that it shall be differently affected by different objects—that it shall be led to act in one way by one object, and in another way by another. In the lower orders of creatures this condition is fulfilled by means of an apparatus which acts automatically. In the higher orders the actions are partly automatic, partly conscious. And in man they are almost wholly conscious. Throughout, however, there must necessarily exist a certain

classification of things according to their properties—a classification which is either organically registered in the system, as in the inferior creation, or is formed by conscious experience, as in ourselves. And it may be further remarked, that the extent to which this classification is carried, roughly indicates the height of intelligence—that, while the lowest organisms are able to do little more than discriminate organic from inorganic matter; while the generality of animals carry their classifications no further than to a limited number of plants or creatures serving for food, a limited number of beasts of prey, and a limited number of places and materials; the most degraded of the human race possess a knowledge of the distinctive natures of a great variety of substances, plants, animals, tools, persons, &c.; not only as classes but as individuals.

What now is the mental process by which classification is effected? Manifestly it is a recognition of the *likeness* or *unlikeness* of things, either in respect of their sizes, colours, forms, weights, textures, tastes, &c., or in respect of their modes of action. By some special mark, sound, or motion, the savage identifies a certain four-legged creature he sees, as one that is good for food, and to be caught in a particular way; or as one that is dangerous; and acts accordingly. He has classed together all the creatures that are *alike* in this particular. And manifestly in choosing the wood out of which to form his bow, the plant with which to poison his arrows, the bone from which to make his fish-hooks, he identifies them through their chief sensible properties as belonging to the general classes, wood, plant, and bone, but distinguishes them as belonging to sub-classes by virtue of certain properties in which they are *unlike* the rest of the general classes they belong to; and so forms genera and species.

And here it becomes manifest that not only is classification carried on by grouping together in the mind things that are *like;* but that classes and sub-classes are formed and arranged according to the *degrees of unlikeness.* Things strongly contrasted are alone distinguished in the lower stages of mental evolution; as may be any day observed in an infant. And gradually as the powers of discrimination increase, the strongly-contrasted classes at first distinguished, come to be each divided into sub-classes, differing from each other less than the classes differ; and these sub-classes are again divided after the same manner. By the continuance of which process, things are gradually arranged into groups, the members of which are less and less *unlike;* ending, finally, in groups whose members differ only as individuals, and not specifically. And thus there tends ultimately to arise the notion of *complete likeness.* For manifestly, it is impossible that groups should continue to be sub-divided in virtue of smaller and smaller differences, without there being a simultaneous approximation to the notion of *no difference.*

Let us next notice that the recognition of likeness and unlikeness, which underlies classification, and out of which continued classification evolves the idea of complete likeness—let us next notice that it also underlies the process of *naming*, and by consequence *language.* For all language consists, at the outset, of symbols which are as *like* to the things symbolized as it is practicable to make them. The language of signs is a means of conveying ideas by mimicking the actions or peculiarities of the things referred to. Verbal language also, in its first stage, is a mode of suggesting objects or acts by imitating the sounds which the objects make, or with which the acts are accompanied. Originally these two languages were used simultaneously. It needs but to watch the gesticulations with which the savage accompanies his speech—to see a Bushman dramatizing before an audience his mode of catching game—or to note the extreme paucity of words in primitive vocabularies; to infer that in the beginning, attitudes, gestures, and sounds, were all combined to

produce as good a *likeness* as possible of the things, animals, persons, or events described; and that as the sounds came to be understood by themselves the gestures fell into disuse: leaving traces, however, in the manners of the more excitable civilized races. But be this as it may, it suffices simply to observe, how many of the words current among barbarous peoples are like the sounds appertaining to the things signified; how many of our own oldest and simplest words have the same peculiarity; how children habitually invent imitative words; and how the sign-language spontaneously formed by deaf mutes is based on imitative actions—to be convinced that the notion of *likeness* is that from which the nomenclature of objects takes its rise. Were there space we might go on to point out how this law of likeness is traceable, not only in the origin but in the development of language; how in primitive tongues the plural is made by a duplication of the singular, which is a multiplication of the word to make it *like* the multiplicity of the things; how the use of metaphor—that prolific source of new words—is a suggesting of ideas which are *like* the ideas to be conveyed in some respect or other; and how, in the copious use of simile, fable, and allegory among uncivilized races, we see that complex conceptions which there is no direct language for, are rendered, by presenting known conceptions more or less *like* them.

This view is confirmed, and the predominance of this notion of likeness in primitive thought further illustrated, by the fact that our system of presenting ideas to the eye originated after the same fashion. Writing and printing have descended from picture-language. The earliest mode of permanently registering a fact was by depicting it on a skin and afterwards on a wall; that is—by exhibiting something as *like* to the thing to be remembered as it could be made. Gradually, as the practice grew habitual and extensive, the most frequently repeated forms became fixed, and presently abbreviated; and, passing through the hieroglyphic and ideographic phases, the symbols lost all apparent relation to the things signified: just as the majority of our spoken words have done.

Observe, again, that the same thing is true respecting the genesis of reasoning. The *likeness* which is perceived to exist between cases, is the essence of all early reasoning and of much of our present reasoning. The savage, having by experience discovered a relation between a certain object and a certain act, infers that the *like* relation will be found in future. And the expressions we use in our arguments—"*analogy* implies," "the cases are not *parallel*," "by *parity* of reasoning," "there is no *similarity*,"—show how constantly the idea of likeness underlies our ratiocinative processes. Still more clearly will this be seen on recognizing the fact that there is a close connexion between reasoning and classification; that the two have a common root; and that neither can go on without the other. For on the one hand, it is a familiar truth that the attributing to a body in consequence of some of its properties, all those other properties in virtue of which it is referred to a particular class, is an act of inference. And, on the other hand, the forming of a generalization is the putting together in one class, all those cases which present like relations; while the drawing a deduction is essentially the perception that a particular case belongs to a certain class of cases previously generalized. So that as classification is a grouping together of *like things*; reasoning is a grouping together of *like relations* among things. Add to which, that while the perfection gradually achieved in classification consists in the formation of groups of *objects* which are *completely alike*; the perfection gradually achieved in reasoning consists in the formation of groups of *cases* which are *completely alike*.

Once more we may contemplate this dominant idea of likeness as exhibited in art. All art, civilized as well as savage, consists almost wholly in the making of

objects *like* other objects; either as found in Nature, or as produced by previous art. If we trace back the varied art-products now existing, we find that at each stage the divergence from previous patterns is but small when compared with the agreement; and in the earliest art the persistency of imitation is yet more conspicuous. The old forms and ornaments and symbols were held sacred, and perpetually copied. Indeed, the strong imitative tendency notoriously displayed by the lowest human races—often seeming to be half automatic, ensures among them a constant reproduction of likenesses of things, forms, signs, sounds, actions and whatever else is imitable; and we may even suspect that this aboriginal peculiarity is in some way connected with the culture and development of this general conception, which we have found so deep and wide-spread in its applications.

And now let us go on to consider how, by a further unfolding of this same fundamental notion, there is a gradual formation of the first germs of science. This idea of likeness which underlies classification, nomenclature, language spoken and written, reasoning, and art; and which plays so important a part because all acts of intelligence are made possible only by distinguishing among surrounding things, or grouping them into like and unlike;—this idea we shall find to be the one of which science is the especial product. Already during the stage we have been describing, there has existed *qualitative* prevision in respect to the commoner phenomena with which savage life is familiar; and we have now to inquire how the elements of *quantitative* prevision are evolved. We shall find that they originate by the perfecting of this same idea of likeness—that they have their rise in that conception of *complete likeness* which, as we have seen, necessarily results from the continued process of classification.

For when the process of classification has been carried as far as it is possible for the uncivilized to carry it—when the animal kingdom has been grouped not merely into quadrupeds, birds, fishes, and insects, but each of these divided into kinds—when there come to be classes, in each of which the members differ only as individuals, and not specifically; it is clear that there must frequently occur an observation of objects which differ so little as to be indistinguishable. Among several creatures which the savage has killed and carried home, it must often happen that some one, which he wished to identify, is so exactly like another that he cannot tell which is which. Thus, then, there originates the notion of *equality*. The things which among ourselves are called *equal*—whether lines, angles, weights, temperatures, sounds or colours—are things which produce in us sensations which cannot be distinguished from each other. It is true that we now apply the word *equal* chiefly to the separate traits or relations which objects exhibit, and not to those combinations of them constituting our conceptions of the objects; but this limitation of the idea has evidently arisen by analysis. That the notion of equality originated as alleged, will, we think, become obvious on remembering that as there were no artificial objects from which it could have been abstracted, it must have been abstracted from natural objects; and that the various families of the animal kingdom chiefly furnish those natural objects which display the requisite exactitude of likeness.

The experiences out of which this general idea of equality is evolved, give birth at the same time to a more complex idea of equality; or, rather, the process just described generates an idea of equality which further experience separates into two ideas—*equality of things* and *equality of relations*. While organic forms occasionally exhibit this perfection of likeness out of which the notion of simple equality arises, they more frequently exhibit only that kind of likeness which we call *similarity*; and which is really compound equality. For the similarity of two creatures of the same

species but of different sizes, is of the same nature as the similarity of two geometrical figures. In either case, any two parts of the one bear the same ratio to one another, as the homologous parts of the other. Given, in a species, the proportions found to exist among the bones, and we may, and zoologists do, predict from any one, the dimensions of the rest; just as, when knowing the proportions subsisting among the parts of a geometrical figure, we may, from the length of one, calculate the others. And if, in the case of similar geometrical figures, the similarity can be established only by proving exactness of proportion among the homologous parts—if we express this relation between two parts in the one, and the corresponding parts in the other, by the formula A is to B as *a* is to *b*; if we otherwise write this, A to B = *a* to *b*; if, consequently, the fact we prove is that the relation of A to B *equals* the relation of *a* to *b*; then it is manifest that the fundamental conception of similarity is *equality of relations.* With this explanation we shall be understood when we say that the notion of equality of relations is the basis of all exact reasoning. Already it has been shown that reasoning in general is a recognition of *likeness* of relations; and here we further find that while the notion of likeness of things ultimately evolves the idea of simple equality, the notion of likeness of relations evolves the idea of equality of relations: of which the one is the concrete germ of exact science, while the other is its abstract germ. Those who cannot understand how the recognition of similarity in creatures of the same kind, can have any alliance with reasoning, will get over the difficulty on remembering that the phenomena among which equality of relations is thus perceived, are phenomena of the same order and are present to the senses at the same time; while those among which developed reason perceives relations, are generally neither of the same order, nor simultaneously present. And if, further, they will call to mind how Cuvier and Owen, from a single part of a creature, as a tooth, construct the rest by a process of reasoning based on this equality of relations, they will see that the two things are intimately connected, remote as they at first seem. But we anticipate. What it concerns us here to observe is, that from familiarity with organic forms there simultaneously arose the ideas of *simple equality*, and *equality of relations.*

At the same time, too, and out of the same mental processes, came the first distinct ideas of *number.* In the earliest stages, the presentation of several like objects produced merely an indefinite conception of multiplicity; as it still does among Australians, and Bushmen, and Damaras, when the number presented exceeds three or four. With such a fact before us we may safely infer that the first clear numerical conception was that of duality as contrasted with unity. And this notion of duality must necessarily have grown up side by side with those of likeness and equality; seeing that it is impossible to recognize the likeness of two things without also perceiving that there are two. From the very beginning the conception of number must have been, as it is still, associated with likeness or equality of the things numbered; and for the purposes of calculation, an ideal equality of the things is assumed. Before any *absolutely true* numerical results can be reached, it is requisite that the units be *absolutely equal.* The only way in which we can establish a numerical relationship between things that do not yield us like impressions, is to divide them into parts that *do* yield us like impressions. Two unlike magnitudes of extension, force, time, weight, or what not, can have their relative amounts estimated, only by means of some small unit that is contained many times in both; and even if we finally write down the greater one as a unit and the other as a fraction of it, we state, in the denominator of the fraction, the number of parts into which the unit must be divided to be comparable with the fraction. It is, indeed, true, that by a modern process

of abstraction, we occasionally apply numbers to unequal units, as the furniture at a sale or the various animals on a farm, simply as so many separate entities; but no exact quantitative result can be brought out by calculation with units of this order. And, indeed, it is the distinctive peculiarity of the calculus in general, that it proceeds on the hypothesis of that absolute equality of its abstract units, which no real units possess; and that the exactness of its results holds only in virtue of this hypothesis. The first ideas of number must necessarily then have been derived from like or equal magnitudes as seen chiefly in organic objects; and as the like magnitudes most frequently observed were magnitudes of extension, it follows that geometry and arithmetic had a simultaneous origin.

Not only are the first distinct ideas of number co-ordinate with ideas of likeness and equality, but the first efforts at numeration display the same relationship. On reading accounts of savage tribes, we find that the method of counting by the fingers, still followed by many children, is the aboriginal method. Neglecting the several cases in which the ability to enumerate does not reach even to the number of fingers on one hand, there are many cases in which it does not extend beyond ten—the limit of the simple finger notation. The fact that in so many instances, remote, and seemingly unrelated nations, have adopted *ten* as their basic number; together with the fact that in the remaining instances the basic number is either *five* (the fingers of one hand) or *twenty* (the fingers and toes); of themselves show that the fingers were the original units of numeration. The still surviving use of the word *digit*, as the general name for a figure in arithmetic, is significant; and it is even said that our word *ten* (Sax. tyn; Dutch, tien; German, zehn) means in its primitive expanded form *two hands*. So that, originally, to say there were ten things, was to say there were two hands of them. From all which evidence it is tolerably clear that the earliest mode of conveying the idea of a number of things, was by holding up as many fingers as there were things; that is, by using a symbol which was *equal*, in respect of multiplicity, to the group symbolized. For which inference there is, indeed, strong confirmation in the statement that our own soldiers spontaneously adopted this device in their dealings with the Turks during the Crimean War. And here it should be remarked that in this re-combination of the notion of equality with that of multiplicity, by which the first steps in numeration are effected, we may see one of the earliest of those inosculations between the diverging branches of science, which are afterwards of perpetual occurrence.

As this observation suggests, it will be well, before tracing the mode in which exact science emerges from the inexact judgments of the senses, and showing the non-serial evolution of its divisions, to note the non-serial character of those preliminary processes of which all after development is a continuation. On reconsidering them it will be seen that not only are they divergent branches from a common root,—not only are they simultaneous in their growth; but that they are mutual aids; and that none can advance without the rest. That progress of classification for which the unfolding of the perceptions paves the way, is impossible without a corresponding progress in language, by which greater varieties of objects are thinkable and expressible. On the one hand classification cannot be carried far without names by which to designate the classes; and on the other hand language cannot be made faster than things are classified. Again, the multiplication of classes and the consequent narrowing of each class, itself involves a greater likeness among the things classed together; and the consequent approach towards the notion of complete likeness itself allows classification to be carried higher. Moreover, classification necessarily advances *pari passu* with rationality—the classification

of *things* with the classification of *relations*. For things that belong to the same class are, by implication, things of which the properties and modes of behaviour—the co-existences and sequences—are more or less the same; and the recognition of this sameness of co-existences and sequences is reasoning. Whence it follows that the advance of classification is necessarily proportionate to the advance of generalizations. Yet further, the notion of *likeness*, both in things and relations, simultaneously evolves by one process of culture the ideas of *equality* of things and *equality* of relations; which are the respective bases of exact concrete reasoning and exact abstract reasoning—Mathematics and Logic. And once more, this idea of equality, in the very process of being formed, necessarily gives origin to two series of relations—those of magnitude and those of number; from which arise geometry and the calculus. Thus the process throughout is one of perpetual subdivision and perpetual intercommunication of the divisions. From the very first there has been that *consensus* of different kinds of knowledge, answering to the *consensus* of the intellectual faculties, which, as already said, must exist among the sciences.

Let us now go on to observe how, out of the notions of *equality* and *number*, as arrived at in the manner described, there gradually arose the elements of quantitative prevision.

Equality, once having come to be definitely conceived, was recognizable among other phenomena than those of magnitude. Being predicable of all things producing indistinguishable impressions, there naturally grew up ideas of equality in weights, sounds, colours, &c.; and, indeed, it can scarcely be doubted that the occasional experience of equal weights, sounds, and colours, had a share in developing the abstract conception of equality—that the ideas of equality in sizes, relations, forces, resistances, and sensible properties in general, were evolved during the same stage of mental development. But however this may be, it is clear that as fast as the notion of equality gained definiteness, so fast did that lowest kind of quantitative prevision which is achieved without any instrumental aid, become possible. The ability to estimate, however roughly, the amount of a foreseen result, implies the conception that it will be *equal* to a certain imagined quantity; and the correctness of the estimate will manifestly depend on the precision which the perceptions of sensible equality have reached. A savage with a piece of stone in his hand, and another piece lying before him of greater bulk but of the same kind (sameness of kind being inferred from the *equality* of the two in colour and texture), knows about what effort he must put forth to raise this other piece; and he judges accurately in proportion to the accuracy with which he perceives that the one is twice, three times, four times, &c., as large as the other; that is—in proportion to the precision of his ideas of equality and number. And here let us not omit to notice that even in these vaguest of quantitative previsions, the conception of *equality of relations* is also involved. For it is only in virtue of an undefined consciousness that the relation between bulk and weight in one stone is *equal* to the relation between bulk and weight in the other, that even the roughest approximation can be made.

But how came the transition from those uncertain perceptions of equality which the unaided senses give, to the certain ones with which science deals? It came by placing the things compared in juxtaposition. Equality being asserted of things which give us indistinguishable impressions, and no distinct comparison of impressions being possible unless they occur in immediate succession, it results that exactness of equality is ascertainable in proportion to the closeness of the compared things. Hence the fact that when we wish to judge of two shades of colour whether they are alike or not, we place them side by side; hence the fact that

we cannot, with any precision, say which of two allied sounds is the louder, or the higher in pitch, unless we hear the one immediately after the other; hence the fact that to estimate the ratio of weights, we take one in each hand, that we may compare their pressures by rapidly alternating in thought from the one to the other; hence the fact, that in a piece of music, we can continue to make equal beats when the first beat has been given, but cannot ensure commencing with the same length of beat on a future occasion; and hence, lastly, the fact, that of all magnitudes, those of *linear extension* are those of which the equality is most precisely ascertainable, and those to which, by consequence, all others have to be reduced. For it is the peculiarity of linear extension that it alone allows its magnitudes to be placed in *absolute* juxtaposition, or, rather, in coincident position; it alone can test the equality of two magnitudes by observing whether they will coalesce, as two equal mathematical lines do, when placed between the same points; it alone can test *equality* by trying whether it will become *identity*. Hence, then, the fact, that all exact science is reducible, by an ultimate analysis, to results measured in equal units of linear extension.

Still it remains to be noticed in what manner this determination of equality by comparison of linear magnitudes originated. Once more may we perceive that surrounding natural objects supplied the needful lessons. From the beginning there must have been a constant experience of like things placed side by side—men standing and walking together; animals from the same herd; fish from the same shoal. And the ceaseless repetition of these experiences could not fail to suggest the observation, that the nearer together any objects were, the more visible became any inequality between them. Hence the obvious device of putting in apposition, things of which it was desired to ascertain the relative magnitudes. Hence the idea of *measure*. And here we suddenly come upon a group of facts which afford a solid basis to the remainder of our argument; while they also furnish strong evidence in support of the foregoing speculations. Those who look sceptically on this attempted rehabilitation of early mental development, and who think that the derivation of so many primary notions from organic forms is somewhat strained, will perhaps see more probability in the hypotheses which have been ventured, on discovering that all measures of *extension* and *force* originated from the lengths and weights of organic bodies, and all measures of *time* from the periodic phenomena of either organic or inorganic bodies.

Thus, among linear measures, the cubit of the Hebrews was the *length of the forearm* from the elbow to the end of the middle finger; and the smaller scriptural dimensions are expressed in *hand-breadths* and *spans*. The Egyptian cubit, which was similarly derived, was divided into digits, which were *finger-breadths*; and each finger-breadth was more definitely expressed as being equal to four *grains of barley* placed breadthwise. Other ancient measures were the orgyia or *stretch of the arms*, the *pace*, and the *palm*. So persistent has been the use of these natural units of length in the East, that even now some Arabs mete out cloth by the forearm. So, too, is it with European measures. The *foot* prevails as a dimension throughout Europe, and has done so since the time of the Romans, by whom, also, it was used: its lengths in different places varying not much more than men's feet vary. The heights of horses are still expressed in *hands*. The inch is the length of the terminal joint of *the thumb*; as is clearly shown in France, where *pouce* means both thumb and inch. Then we have the inch divided into three *barley-corns*. So completely, indeed, have these organic dimensions served as the substrata of mensuration, that it is only by means of them that we can form any estimate of some of the ancient distances. For example, the

length of a degree on the Earth's surface, as determined by the Arabian astronomers shortly after the death of Haroun-al-Raschid, was fifty-six of their miles. We know nothing of their mile further than that it was 4,000 cubits; and whether these were sacred cubits or common cubits, would remain doubtful, but that the length of the cubit is given as twenty-seven inches, and each inch defined as the thickness of six barley-grains. Thus one of the earliest measurements of a degree comes down to us in barley-grains. Not only did organic lengths furnish those approximate measures which satisfied men's needs in ruder ages, but they furnished also the standard measures required in later times. One instance occurs in our own history. To remedy the irregularities then prevailing, Henry I. commanded that the ulna, or ancient ell, which answers to the modern yard, should be made of the exact length of *his own arm*.

Measures of weight had a kindred derivation. Seeds seem commonly to have supplied the units. The original of the carat used for weighing in India is *a small bean*. Our own systems, both troy and avoirdupois, are derived primarily from wheat-corns. Our smallest weight, the grain, is *a grain of wheat*. This is not a speculation; it is an historically-registered fact. Henry III. enacted that an ounce should be the weight of 640 dry grains of wheat from the middle of the ear. And as all the other weights are multiples or sub-multiples of this, it follows that the grain of wheat is the basis of our scale. So natural is it to use organic bodies as weights, before artificial weights have been established, or where they are not to be had, that in some of the remoter parts of Ireland the people are said to be in the habit, even now, of putting a man into the scales to serve as a measure for heavy commodities.

Similarly with time. Astronomical periodicity, and the periodicity of animal and vegetal life, are simultaneously used in the first stages of progress for estimating epochs. The simplest unit of time, the day, nature supplies ready made. The next simplest period, the moneth or month, is also thrust upon men's notice by the conspicuous changes constituting a lunation. For larger divisions than these, the phenomena of the seasons, and the chief events from time to time occurring, have been used by early and uncivilized races. Among the Egyptians the rising of the Nile served as a mark. The New Zealanders were found to begin their year from the reappearance of the Pleiades above the sea. One of the uses ascribed to birds, by the Greeks, was to indicate the seasons by their migrations. Barrow describes the aboriginal Hottentot as expressing dates by the number of moons before or after the ripening of one of his chief articles of food. He further states that the Kaffir chronology is kept by the moon, and is registered by notches on sticks—the death of a favourite chief, or the gaining of a victory, serving for a new era. By which last fact, we are at once reminded that in early history, events are commonly recorded as occurring in certain reigns, and in certain years of certain reigns: a proceeding which made a king's reign a rude measure of duration. And, as further illustrating the tendency to divide time by natural phenomena and natural events, it may be noticed that even by our own peasantry the definite divisions of months and years are but little used; and that they habitually refer to occurrences as "before sheep-shearing," or "after harvest," or "about the time when the squire died." It is manifest, therefore, that the approximately equal periods perceived in Nature gave the first units of measure for time; as did Nature's approximately equal lengths and weights give the first units of measure for space and force.

It remains only to observe, that measures of value were similarly derived. Barter, in one form or other, is found among all but the very lowest human races. It is obviously based upon the

notion of *equality of worth*. And as it gradually merges into trade by the introduction of some kind of currency, we find that the *measures of worth*, constituting this currency, are organic bodies; in some cases *cowries*, in others *cocoa-nuts*, in others *cattle*, in others *pigs*; among the American Indians peltry or *skins*, and in Iceland *dried fish*.

Notions of exact equality and of measure having been reached, there arose definite ideas of magnitudes as being multiples one of another; whence the practice of measurement by direct apposition of a measure. The determination of linear extensions by this process can scarcely be called science, though it is a step towards it; but the determination of lengths of time by an analogous process may be considered as one of the earliest samples of quantitative prevision. For when it is first ascertained that the moon completes the cycle of her changes in about thirty days—a fact known to most uncivilized tribes that can count beyond the number of their fingers—it is manifest that it becomes possible to say in what number of days any specified phase of the moon will recur; and it is also manifest that this prevision is effected by an apposition of two times, after the same manner that linear space is measured by the apposition of two lines. For to express the moon's period in days, is to say how many of these units of measure are contained in the period to be measured—is to ascertain the distance between two points in time by means of a *scale of days*, just as we ascertain the distance between two points in space by a scale of feet or inches; and in each case the scale coincides with the thing measured—mentally in the one, visibly in the other. So that in this simplest, and perhaps earliest case of quantitative prevision, the phenomena are not only thrust daily upon men's notice, but Nature is, as it were, perpetually repeating that process of measurement by observing which the prevision is effected.

This fact, that in very early stages of social progress it is known that the moon goes through her changes in nearly thirty days, and that in rather more than twelve moons the seasons return—this fact that chronological astronomy assumes a certain scientific character even before geometry does; while it is partly due to the circumstance that the astronomical divisions, day, month, and year, are ready made for us, is partly due to the further circumstances that agricultural and other operations were at first regulated astronomically, and that from the supposed divine nature of the heavenly bodies their motions determined the periodical religious festivals. As instances of the one we have the observation of the Egyptians, that the rising of the Nile corresponded with the heliacal rising of Sirius; the directions given by Hesiod for reaping and ploughing, according to the positions of the Pleiades; and his maxim that "fifty days after the turning of the sun is a seasonable time for beginning a voyage." As instances of the other, we have the naming of the days after the sun, moon, and planets; the early attempts among Eastern nations to regulate the calendar so that the gods might not be offended by the displacement of their sacrifices; and the fixing of the great annual festival of the Peruvians by the position of the sun. In all which facts we see that, at first, science was simply an appliance of religion and industry.

After the discoveries that a lunation occupies nearly thirty days, and that some twelve lunations occupy a year—discoveries which we may infer were the earliest, from the fact that existing uncivilized races have made them—we come to the first known astronomical records, which are those of eclipses. The Chaldeans were able to predict these. "These they did, probably," says Dr. Whewell in his useful history, from which most of the materials we are about to use will be drawn, "by means of their cycle of 233 months, or about eighteen years; for, at the end of this time, the eclipses of the moon begin to return, at

the same intervals and in the same order as at the beginning." Now this method of calculating eclipses by means of a recurring cycle,—the *Saros* as they called it—is a more complex case of prevision by means of coincidence of measures. For by what observations must the Chaldeans have discovered this cycle? Obviously, as Delambre infers, by inspecting their registers; by comparing the successive intervals; by finding that some of the intervals were alike; by seeing that these equal intervals were eighteen years apart; by discovering that *all* the intervals that were eighteen years apart were equal; by ascertaining that the intervals formed a series which repeated itself, so that if one of the cycles of intervals were superposed on another the divisions would fit. And this being once perceived, it became possible to use the cycle as a scale of time by which to measure out future periods of recurrence. Seeing thus that the process of so predicting eclipses, is in essence the same as that of predicting the moon's monthly changes by observing the number of days after which they repeat—seeing that the two differ only in the extent and irregularity of the intervals; it is not difficult to understand how such an amount of knowledge should so early have been reached. And we shall be the less surprised on remembering that the only things involved in these previsions were *time* and *number;* and that the time was in a manner self-numbered.

Still, the ability to predict events recurring only after so long a period as eighteen years, implies a considerable advance in civilization—a considerable development of general knowledge; and we have now to inquire what progress in other sciences accompanied, and was necessary to, these astronomical previsions. In the first place, there must have been a tolerably efficient system of calculation. Mere finger-counting, mere head-reckoning, even with the aid of a decimal notation, could not have sufficed for numbering the days in a year; much less the years, months, and days between eclipses. Consequently there must have been a mode of registering numbers; probably even a system of numerals. The earliest numerical records, if we may judge by the practices of the less civilized races now existing, were probably kept by notches cut on sticks, or strokes marked on walls; much as public-house scores are kept now. And there is reason to think that the first numerals used were simply groups of straight strokes, as some of the still-extant Roman ones are; leading us to suspect that these groups of strokes were used to represent groups of fingers, as the groups of fingers had been used to represent groups of objects—a supposition harmonizing with the aboriginal practice of picture writing. Be this so or not, however, it is manifest that before the Chaldeans discovered their *Saros*, they must have had both a set of written symbols serving for an extensive numeration, and a familiarity with the simpler rules of arithmetic.

Not only must abstract mathematics have made some progress, but concrete mathematics also. It is scarcely possible that the buildings belonging to this era should have been laid out and erected without any knowledge of geometry. At any rate, there must have existed that elementary geometry which deals with direct measurement—with the apposition of lines; and it seems that only after the discovery of those simple proceedings, by which right angles are drawn, and relative positions fixed, could so regular an architecture be executed. In the case of the other division of concrete mathematics—mechanics, we have definite evidence of progress. We know that the lever and the inclined plane were employed during this period: implying that there was a qualitative prevision of their effects, if not a quantitative one. But we know more. We read of weights in the earliest records; and we find weights in ruins of the highest antiquity. Weights imply scales, of which we have also mention; and scales involve the primary theorem of mechanics in its

least complicated form—involve not a qualitative but a quantitative prevision of mechanical effects. And here we may notice how mechanics, in common with the other exact sciences, took its rise from the simplest application of the idea of *equality*. For the mechanical proposition which the scales involve, is, that if a lever with *equal* arms, have *equal* weights suspended from them, the weights will remain at *equal* altitudes. And we may further notice how, in this first step of rational mechanics, we see illustrated the truth awhile since named, that as magnitudes of linear extension are the only ones of which the equality is exactly ascertainable, the equalities of other magnitudes have at the outset to be determined by means of them. For the equality of the weights which balance each other in scales, depends on the equality of the arms: we can know that the weights are equal only by proving that the arms are equal. And when by this means we have obtained a system of weights,—a set of equal units of force and definite multiples of them, then does a science of mechanics become possible. Whence, indeed, it follows, that rational mechanics could not possibly have any other starting-point than the scales.

Let us further remember that during this same period there was some knowledge of chemistry. Sundry of the arts which we know to have been carried on, were made possible only by a generalized experience of the modes in which certain bodies affect each other under special conditions. In metallurgy, which was extensively practised, this is abundantly illustrated. And we even have evidence that in some cases the knowledge possessed was, in a sense, quantitative. For, as we find by analysis that the hard alloy of which the Egyptians made their cutting tools, was composed of copper and tin in fixed proportions, there must have been an established prevision that such an alloy was to be obtained only by mixing them in these proportions. It is true, this was but a simple empirical generalization; but so was the generalization respecting the recurrence of eclipses; so are the first generalizations of every science.

Respecting the simultaneous advance of the sciences during this early epoch, it remains to point out that even the most complex of them must have made some progress. For under what conditions only were the foregoing developments possible? The conditions furnished by an established and organized social system. A long continued registry of eclipses; the building of palaces; the use of scales; the practice of metallurgy—alike imply a settled and populous nation. The existence of such a nation not only presupposes laws and some administration of justice, which we know existed, but it presupposes successful laws—laws conforming in some degree to the conditions of social stability—laws enacted because it was found that the actions forbidden by them were dangerous to the State. We do not by any means say that all, or even the greater part, of the laws were of this nature; but we do say, that the fundamental ones were. It cannot be denied that the laws affecting life and property were such. It cannot be denied that, however little these were enforced between class and class, they were to a considerable extent enforced between members of the same class. It can scarcely be questioned, that the administration of them between members of the same class was seen by rulers to be necessary for keeping society together. But supposition aside, it is clear that the habitual recognition of these claims in their laws, implied some prevision of social phenomena. That same idea of *equality*, which, as we have seen, underlies other science, underlies also morals and sociology. The conception of justice, which is the primary one in morals; and the administration of justice, which is the vital condition to social existence; are impossible without the recognition of a certain likeness in men's claims, in virtue of their common humanity. *Equity* literally means *equalness;* and if it be admitted that there

were even the vaguest ideas of equity in these primitive eras, it must be admitted that there was some appreciation of the equalness of men's liberties to pursue the objects of life—some appreciation, therefore, of the essential principle of national equilibrium.

Thus in this initial stage of the positive sciences, before geometry had yet done more than evolve a few empirical rules—before mechanics had passed beyond its first theorem—before astronomy had advanced from its merely chronological phase into the geometrical; the most involved of the sciences had reached a certain degree of development—a development without which no progress in other sciences was possible.

Only noting as we pass, how, thus early, we may see that the progress of exact science was not only towards an increasing number of previsions, but towards previsions more accurately quantitative—how, in astronomy, the recurring period of the moon's motions was by and by more correctly ascertained to be two hundred and thirty-five lunations; how Callipus further corrected this Metonic cycle, by leaving out a day at the end of every seventy-six years; and how these successive advances implied a longer continued registry of observations, and the co-ordination of a greater number of facts; let us go on to inquire how geometrical astronomy took its rise. The first astronomical instrument was the gnomon. This was not only early in use in the East, but it was found among the Mexicans; the sole astronomical observations of the Peruvians were made by it; and we read that 1100 B.C., the Chinese observed that, at a certain place, the length of the sun's shadow, at the summer solstice, was to the height of the gnomon, as one and a half to eight. Here again it is observable, both that the instrument is found ready-made, and that Nature is perpetually performing the process of measurement. Any fixed, erect object—a column, a pole, the angle of a building—serves for a gnomon; and it needs but to notice the changing position of the shadow it daily throws, to make the first step in geometrical astronomy. How small this first step was, may be seen in the fact that the only things ascertained at the outset were the periods of the summer and winter solstices, which corresponded with the least and greatest lengths of the mid-day shadow; and to fix which, it was needful merely to mark the point to which each day's shadow reached. And now let it not be overlooked that in the observing at what time during the next year this extreme limit of the shadow was again reached, and in the inference that the sun had then arrived at the same turning point in his annual course, we have one of the simplest instances of that combined use of *equal magnitudes* and *equal relations*, by which all exact science, all quantitative prevision, is reached. For the relation observed was between the length of the gnomon's shadow and the sun's position in the heavens; and the inference drawn was that when, next year, the extremity of the shadow came to the same point, he occupied the same place. That is, the ideas involved were, the equality of the shadows, and the equality of the relations between shadow and sun in successive years. As in the case of the scales, the equality of relations here recognized is of the simplest order. It is not as those habitually dealt with in the higher kinds of scientific reasoning, which answer to the general type—the relation between two and three equals the relation between six and nine; but it follows the type—the relation between two and three equals the relation between two and three: it is a case of not simply *equal* relations, but *coinciding* relations. And here, indeed, we may see beautifully illustrated how the idea of equal relations takes its rise after the same manner that that of equal magnitudes does. As already shown, the idea of equal magnitudes arose from the observed coincidence of two lengths placed together; and in this case we have not only two coincident lengths of shadows, but

two coincident relations between sun and shadows.

From the use of the gnomon there naturally grew up the conception of angular measurements; and with the advance of geometrical conceptions came the hemisphere of Berosus, the equinoctial armil, the solstitial armil, and the quadrant of Ptolemy—all of them employing shadows as indices of the sun's position, but in combination with angular divisions. It is out of the question for us here to trace these details of progress. It must suffice to remark that in all of them we may see that notion of equality of relations of a more complex kind, which is best illustrated in the astrolabe, an instrument which consisted "of circular rims, moveable one within the other, or about poles, and contained circles which were to be brought into the position of the ecliptic, and of a plane passing through the sun and the poles of the ecliptic"—an instrument, therefore, which represented, as by a model, the relative positions of certain imaginary lines and planes in the heavens; which was adjusted by putting these representative lines and planes into parallelism with the celestial ones; and which depended for its use on the perception that the relations among these representative lines and planes were *equal* to the relations among those represented. We might go on to point out how the conception of the heavens as a revolving hollow sphere, the explanation of the moon's phases, and indeed all the successive steps taken, involved this same mental process. But we must content ourselves with referring to the theory of eccentrics and epicycles, as a further marked illustration of it. As first suggested, and as proved by Hipparchus to afford an explanation of the leading irregularities in the celestial motions, this theory involved the perception that the progressions, retrogressions, and variations of velocity seen in the heavenly bodies, might be reconciled with their assumed uniform movements in circles, by supposing that the earth was not in the centre of their orbits; or by supposing that they revolved in circles whose centres revolved round the earth; or by both. The discovery that this would account for the appearances, was the discovery that in certain geometrical diagrams the relations were such, that the uniform motion of points along curves conditioned in specified ways, would, when looked at from a particular position, present analogous irregularities; and the calculations of Hipparchus involved the belief that the relations subsisting among these geometrical curves were *equal* to the relations subsisting among the celestial orbits.

Leaving here these details of astronomical progress, and the philosophy of it, let us observe how the relatively concrete science of geometrical astronomy, having been thus far helped forward by the development of geometry in general, reacted upon geometry, caused it also to advance, and was again assisted by it. Hipparchus, before making his solar and lunar tables, had to discover rules for calculating the relations between the sides and angles of triangles—*trigonometry*, a subdivision of pure mathematics. Further, the reduction of the doctrine of the sphere to a quantitative form needed for astronomical purposes, required the formation of a *spherical trigonometry*, which was also achieved by Hipparchus. Thus both plane and spherical trigonometry, which are parts of the highly abstract and simple science of extension, remained undeveloped until the less abstract and more complex science of the celestial motions had need of them. The fact admitted by M. Comte, that since Descartes the progress of the abstract division of mathematics has been determined by that of the concrete division, is paralleled by the still more significant fact that even thus early the progress of mathematics was determined by that of astronomy. And here, indeed, we see exemplified the truth, which the subsequent history of science frequently illustrates, that before any more abstract division makes a further advance, some

more concrete division suggests the necessity for that advance—presents the new order of questions to be solved. Before astronomy put before Hipparchus the problem of solar tables, there was nothing to raise the question of the relations between lines and angles: the subject-matter of trigonometry had not been conceived.

Just incidentally noticing the circumstance that the epoch we are describing witnessed the evolution of algebra, a comparatively abstract division of mathematics, by the union of its less abstract divisions, geometry and arithmetic (a fact proved by the earliest extant samples of algebra, which are half algebraic, half geometric), we go on to observe that during the era in which mathematics and astronomy were thus advancing, rational mechanics made its second step; and something was done towards giving a quantitative form to hydrostatics, optics, and acoustics. In each case we shall see how the idea of equality underlies all quantitative prevision; and in what simple forms this idea is first applied.

As already shown, the first theorem established in mechanics was, that equal weights suspended from a lever with equal arms would remain in equilibrium. Archimedes discovered that a lever with unequal arms was in equilibrium when one weight was to its arm as the other arm to its weight; that is—when the numerical relation between one weight and its arm was *equal* to the numerical relation between the other arm and its weight.

The first advance made in hydrostatics, which we also owe to Archimedes, was the discovery that fluids press *equally* in all directions; and from this followed the solution of the problem of floating bodies; namely, that they are in equilibrium when the upward and downward pressures are *equal*.

In optics, again, the Greeks found that the angle of incidence is *equal* to the angle of reflection; and their knowledge reached no further than to such simple deductions from this as their geometry sufficed for. In acoustics they ascertained the fact that three strings of *equal* lengths would yield the octave, fifth and fourth, when strained by weights having certain definite ratios; and they did not progress much beyond this. In the one of which cases we see geometry used in elucidation of the laws of light; and in the other, geometry and arithmetic made to measure certain phenomena of sound.

While sundry sciences had thus reached the first stages of quantitative prevision, others were progressing in qualitative prevision. It must suffice just to note that some small generalizations were made respecting evaporation, and heat, and electricity, and magnetism, which, empirical as they were, did not in that respect differ from the first generalizations of every science; that the Greek physicians had made advances in physiology and pathology, which, considering the great imperfection of our present knowledge, are by no means to be despised; that zoology had been so far systematized by Aristotle, as, to some extent, enabled him from the presence of certain organs, to predict the presence of others; that in Aristotle's *Politics*, is shown progress towards a scientific conception of social phenomena, and sundry previsions respecting them; and that in the state of the Greek societies, as well as in the writings of Greek philosophers, we may recognize both an increasing clearness in the conception of equity and some appreciation of the fact that social stability depends on the maintenance of equitable relations. Space permitting, we might dwell on the causes which retarded the development of some of the sciences, as, for example, chemistry; showing that relative complexity had nothing to do with it—that the oxidation of a piece of iron is a simpler phenomenon than the recurrence of eclipses, and the discovery of carbonic acid less difficult than that of the precession of the equinoxes. The relatively slow advance of chemical knowledge might

be shown to be due, partly to the fact that its phenomena were not daily thrust on men's notice as those of astronomy were; partly to the fact that Nature does not habitually supply the means, and suggest the modes of investigation, as in the sciences dealing with time, extension, and force; partly to the fact that the great majority of the materials with which chemistry deals, instead of being ready to hand, are made known only by the arts in their slow growth; and partly to the fact that even when known, their chemical properties are not self-exhibited, but have to be sought out by experiment.

Merely indicating these considerations, however, let us go on to contemplate the progress and mutual influence of the sciences in modern days; only parenthetically noticing how, on the revival of the scientific spirit, the successive stages achieved exhibit the dominance of the law hitherto traced—how the primary idea in dynamics, a uniform force, was defined by Galileo to be a force which generates *equal* velocities in *equal* successive times—how the uniform action of gravity was first experimentally determined by showing that the time elapsing before a body thrown up, stopped, was *equal* to the time it took to fall—how the first fact in compound motion which Galileo ascertained was, that a body projected horizontally, will describe *equal* horizontal spaces in *equal* times, compounded vertical spaces described which increase by equal increments in *equal* times—how his discovery respecting the pendulum was, that its oscillations occupy *equal* intervals of time whatever their lengths—how the law which he established that in any machine the weights that balance each other, are reciprocally as their virtual velocities implies that the relation of one set of weights to their velocities *equals* the relation of the other set of velocities to their weights;—and how thus his achievements consisted in showing the equalities of certain magnitudes and relations, whose equalities had not been previously recognized.

And now, but only now, physical astronomy became possible. The simple laws of force had been disentangled from those of friction and atmospheric resistance by which all their earthly manifestations are disguised. Progressing knowledge of *terrestrial physics* had given a due insight into these disturbing causes; and, by an effort of abstraction, it was perceived that all motion would be uniform and rectilinear unless interfered with by external forces. Geometry and mechanics having diverged from a common root in men's sensible experiences, and having, with occasional inosculations, been separately developed, the one partly in connexion with astronomy, the other solely by analyzing terrestrial movements, now join in the investigations of Newton to create a true theory of the celestial motions. And here, also, we have to notice the important fact that, in the very process of being brought jointly to bear upon astronomical problems, they are themselves raised to a higher phase of development. For it was in dealing with the questions raised by celestial dynamics that the then incipient infinitesimal calculus was unfolded by Newton and his Continental successors; and it was from inquiries into the mechanics of the solar system that the general theorems of mechanics contained in the *Principia*—many of them of purely terrestrial application—took their rise. Thus, as in the case of Hipparchus, the presentation of a new order of concrete facts to be analyzed, led to the discovery of new abstract facts; and these abstract facts then became instruments of access to endless groups of concrete facts previously beyond quantitative treatment.

Meanwhile, physics had been carrying further that progress without which, as just shown, rational mechanics could not be disentangled. In hydrostatics, Stevinus had extended and applied the discovery of Archimedes. Torricelli had proved atmospheric pressure, "by showing that this pressure sustained different liquids at heights inversely proportional

to their densities;" and Pascal "established the necessary diminution of this pressure at increasing heights in the atmosphere": discoveries which in part reduced this branch of science to a quantitative form. Something had been done by Daniel Bernouilli towards the dynamics of fluids. The thermometer had been invented; and sundry small generalizations reached by it. Huyghens and Newton had made considerable progress in optics; Newton had approximately calculated the rate of transmission of sound; and the Continental mathematicians had ascertained some of the laws of sonorous vibrations. Magnetism and electricity had been considerably advanced by Gilbert. Chemistry had got as far as the mutual neutralization of acids and alkalies. And Leonardo da Vinci had advanced in geology to the conclusion that the deposition of animal remains in marine strata is the origin of fossils. Our present purpose does not require that we should give particulars. Here it only concerns us to illustrate the *consensus* subsisting in this stage of growth, and afterwards. Let us look at a few cases.

The theoretic law of the velocity of sound deduced by Newton from purely mechanical data, was found wrong by one-sixth. The error remained unaccounted for until the time of Laplace, who, suspecting that the heat disengaged by the compression of the undulating strata of the air, gave additional elasticity, and so produced the difference, made the needful calculations and found he was right. Thus acoustics was arrested until thermology overtook and aided it. When Boyle and Marriot had discovered the relation between the densities of gases and the pressures they are subject to; and when it thus became possible to calculate the rate of decreasing density in the upper parts of the atmosphere; it also became possible to make approximate tables of the atmospheric refraction of light. Thus optics, and with it astronomy, advanced with barology. After the discovery of atmospheric pressure had led to the invention of the air-pump by Otto Guericke; and after it had become known that evaporation increases in rapidity as atmospheric pressure decreases; it became possible for Leslie, by evaporation in a vacuum, to produce the greatest cold known; and so to extend our knowledge of thermology by showing that there is no zero within reach of our researches. When Fourier had determined the laws of conduction of heat, and when the Earth's temperature had been found to increase below the surface one degree in every forty yards, there were data for inferring the past condition of our globe; the vast period it has taken to cool down to its present state; and the immense age of the solar system—a purely astronomical consideration. Chemistry having advanced sufficiently to supply the needful materials, and a physiological experiment having furnished the requisite hint, there came the discovery of galvanic electricity. Galvanism reacting on chemistry disclosed the metallic bases of the alkalies and earths, and inaugurated the electro-chemical theory; in the hands of Oersted and Ampère it led to the laws of magnetic action; and by its aid Faraday has detected significant facts relative to the constitution of light. Brewster's discoveries respecting double refraction and dipolarization proved the essential truth of the classification of crystalline forms according to the number of axes, by showing that the molecular constitution depends on the axes. Now in these and in numerous other cases, the mutual influence of the sciences has been quite independent of any supposed hierarchical order. Often, too, their interactions are more complex than as thus instanced—involve more sciences than two. One illustration of this must suffice. We quote it in full from the *History of the Inductive Sciences*. In Book XI., chap. II., on "The Progress of the Electrical Theory," Dr. Whewell writes:—

Thus at that period, mathematics was behind experiment, and a problem was proposed, in which theoretical numerical results

were wanted for comparison with observation, but could not be accurately obtained; as was the case in astronomy also, till the time of the approximate solution of the problem of three bodies, and the consequent formation of the tables of the moon and planets, on the theory of universal gravitation. After some time, electrical theory was relieved from this reproach, mainly in consequence of the progress which astronomy had occasioned in pure mathematics. About 1801 there appeared in the *Bulletin des Sciences*, an exact solution of the problem of the distribution of electric fluid on a spheroid, obtained by Biot, by the application of the peculiar methods which Laplace had invented for the problem of the figure of the planets. And, in 1811, M. Poisson applied Laplace's artifices to the case of two spheres acting upon one another in contact, a case to which many of Coulomb's experiments were referrible; and the agreement of the results of theory and observation, thus extricated from Coulomb's numbers obtained above forty years previously, was very striking and convincing.

Not only do the sciences affect each other after this direct manner, but they affect each other indirectly. Where there is no dependence, there is yet analogy—*likeness of relations*; and the discovery of the relations subsisting among one set of phenomena, constantly suggests a search for similar relations among another set. Thus the established fact that the force of gravitation varies inversely as the square of the distance, being recognized as a necessary characteristic of all influences proceeding from a centre, raised the suspicion that heat and light follow the same law; which proved to be the case—a suspicion and a confirmation which were repeated in respect to the electric and magnetic forces. Thus, again, the discovery of the polarization of light led to experiments which ended in the discovery of the polarization of heat—a discovery that could never have been made without the antecedent one. Thus, too, the known refrangibility of light and heat lately produced the inquiry whether sound also is not refrangible; which on trial it turns out to be. In some cases, indeed, it is only by the aid of conceptions derived from one class of phenomena that hypotheses respecting other classes can be formed. The theory, at one time favoured, that evaporation is a solution of water in air, assumed that the relation between water and air is *like* the relation between water and a dissolved solid; and could never have been conceived if relations like that between salt and water had not been previously known. Similarly the received theory of evaporation—that it is a diffusion of the particles of the evaporating fluid in virtue of their atomic repulsion—could not have been entertained without a foregoing experience of magnetic and electric repulsions. So complete in recent days has become this *consensus* among the sciences, caused either by the natural entanglement of their phenomena, or by analogies between the relations of their phenomena, that scarcely any considerable discovery concerning one order of facts now takes place, without shortly leading to discoveries concerning other orders.

To produce a complete conception of this process of scientific evolution it would be needful to go back to the beginning, and trace in detail the growth of classifications and nomenclatures; and to show how, as subsidiary to science, they have acted upon it while it has reacted upon them. We can only now remark that, on the one hand, classifications and nomenclatures have aided science by subdividing the subject-matter of research, and giving fixity and diffusion to the truths disclosed; and that on the other hand, they have caught from it that increasing quantitativeness, and that progress from considerations touching single phenomena to considerations touching the relations among many phenomena, which we have been describing. Of this last influence a few illustrations must be given. In chemistry it is seen in the facts that the dividing of matter into the four elements was ostensibly based on the single property of weight, that the first truly chemical division into acid and alkaline bodies, grouped together bodies which had not simply one property in common but in which one property was constantly related to many others, and that the

classification now current, places together in the groups *supporters of combustion*, *metallic and non-metallic bases*, *acids*, *salts*, &c., bodies which are often quite unlike in sensible qualities, but which are like in the majority of their *relations* to other bodies. In mineralogy again, the first classifications were based on differences in aspect, texture, and other physical attributes. Berzelius made two attempts at a classification based solely on chemical constitution. That now current recognizes, as far as possible, the *relations* between physical and chemical characters. In botany the earliest classes formed were *trees*, *shrubs*, and *herbs:* magnitude being the basis of distinction. Dioscorides divided vegetables into *aromatic*, *alimentary*, *medicinal*, and *vinous:* a division of chemical character. Cæsalpinus classified them by the seeds and seed-vessels, which he preferred because of the *relations* found to subsist between the character of the fructification and the general character of the other parts. While the "natural system" since developed, carrying out the doctrine of Linnæus, that "the natural orders must be formed by attention not to one or two, but to *all* the parts of plants," bases its divisions on like peculiarities which are found to be *constantly related* to the greatest number of other like peculiarities. And similarly in zoology, the successive classifications, from having been originally determined by external and often subordinate characters not indicative of the essential nature, have been more and more determined by those internal and fundamental differences, which have uniform *relations* to the greatest number of other differences. Nor shall we be surprised at this analogy between the modes of progress of positive science and classification, when we bear in mind that both proceed by making generalizations; that both enable us to make previsions, differing only in their precision; and that while the one deals with equal properties, magnitudes, and relations, the other deals with properties and relations which approximate towards equality in various degrees.

Without further argument it will, we think, be admitted that the sciences are none of them separately evolved—are none of them independent either logically or historically; but that all of them have, in a greater or less degree, required aid and reciprocated it. Indeed, it needs but to throw aside hypotheses, and contemplate the mixed character of surrounding phenomena, to see at once that these notions of division and succession in the kinds of knowledge are simply scientific fictions: good, if regarded merely as aids to study; bad, if regarded as representing realities in Nature. No facts whatever are presented to our senses uncombined with other facts—no facts whatever but are in some degree disguised by accompanying facts: disguised in such a manner that all must be partially understood before any one can be understood. If it be said, as by M. Comte, that gravitating force should be treated of before other forces, seeing that all things are subject to it, it may on like grounds be said that heat should be first dealt with; seeing that thermal forces are everywhere in action. Nay more, it may be urged that the ability of any portion of matter to manifest visible gravitative phenomena depends on its state of aggregation, which is determined by heat; that only by the aid of thermology can we explain those apparent exceptions to the gravitating tendency which are presented by steam and smoke, and so establish its universality; and that, indeed, the very existence of the Solar System in a solid form is just as much a question of heat as it is one of gravitation. Take other cases:—All phenomena recognized by the eyes, through which only are the data of exact science ascertainable, are complicated with optical phenomena, and cannot be exhaustively known until optical principles are known. The burning of a candle cannot be explained without involving chemistry, mechanics, thermology. Every wind that blows is determined by influences partly solar, partly

lunar, partly hygrometric; and implies considerations of fluid equilibrium and physical geography. The direction, dip, and variations of the magnetic needle, are facts half terrestrial, half celestial—are caused by earthly forces which have cycles of change corresponding with astronomical periods. The flowing of the Gulf Stream and the annual migration of icebergs towards the equator, involve in their explanation the Earth's rotation and spheroidal form, the laws of hydrostatics, the relative densities of cold and warm water, and the doctrines of evaporation. It is no doubt true, as M. Comte says, that "our position in the Solar System, and the motions, form, size, and equilibrium of the mass of our world among the planets, must be known before we can understand the phenomena going on at its surface." But, fatally for his hypothesis, it is also true that we must understand a great part of the phenomena going on at its surface before we can know its position, &c., in the Solar System. It is not simply that, as already shown, those geometrical and mechanical principles by which celestial appearances are explained, were first generalized from terrestrial experiences; but it is that even the obtainment of correct data on which to base astronomical generalizations, implies advanced terrestrial physics. Until after optics had made considerable advance, the Copernican system remained but a speculation. A single modern observation on a star has to undergo a careful analysis by the combined aid of various sciences—has to *be digested by the organism of the sciences;* which have severally to assimilate their respective parts of the observation, before the essential fact it contains is available for the further development of astronomy. It has to be corrected not only for nutation of the Earth's axis and for precession of the equinoxes, but for aberration and for refraction; and the formation of the tables by which refraction is calculated, presupposes knowledge of the law of decreasing density in the upper atmospheric strata, of the law of decreasing temperature and the influence of this on the density, and of hygrometric laws as also affecting density. So that, to get materials for further advance, astronomy requires not only the indirect aid of the sciences which have presided over the making of its improved instruments, but the direct aid of an advanced optics, of barology, of thermology, of hygrometry; and if we remember that these delicate observations are in some cases registered electrically, and that they are further corrected for the "personal equation"—the time elapsing between seeing and registering, which differs with different observers—we may even add electricity and psychology. And here, before leaving these illustrations, and especially this last one, let us not omit to notice how well they exhibit that increasingly active *consensus* of the sciences which characterizes their advancing development. Besides finding that in these later times a discovery in one science commonly causes progress in others; besides finding that a great part of the questions with which modern science deals are so mixed as to require the co-operation of many sciences for their solution; we find that, to make a single good observation in the purest of the natural sciences, requires the combined aid of half a dozen other sciences.

Perhaps the clearest comprehension of the interconnected growth of the sciences may be obtained by contemplating that of the arts, to which it is strictly analogous, and with which it is bound up. Most intelligent persons must have been occasionally struck with the numerous antecedents pre-supposed by one of our processes of manufacture. Let him trace the production of a printed cotton, and consider all that is implied by it. There are the many successive improvements through which the power-looms reached their present perfection; there is the steam-engine that drives them, having its long history from Papin downwards; there are the lathes in which its cylinder was bored, and the string of ancestral

lathes from which those lathes proceeded; there is the steam-hammer under which its crank shaft was welded; there are the puddling furnaces, the blast-furnaces, the coal-mines and the iron-mines needful for producing the raw material; there are the slowly improved appliances by which the factory was built, and lighted, and ventilated; there are the printing engine, and the dye-house, and the colour-laboratory with its stock of materials from all parts of the world, implying cochineal-culture, logwood-cutting, indigo-growing; there are the implements used by the producers of cotton, the gins by which it is cleaned, the elaborate machines by which it is spun; there are the vessels in which cotton is imported, with the building-slips, the rope-yards, the sail-cloth factories, the anchor-forges, needful for making them; and besides all these directly necessary antecedents, each of them involving many others, there are the institutions which have developed the requisite intelligence, the printing and publishing arrangements which have spread the necessary information, the social organization which has rendered possible such a complex co-operation of agencies. Further analysis would show that the many arts thus concerned in the economical production of a child's frock, have each been brought to its present efficiency by slow steps which the other arts have aided; and that from the beginning this reciprocity has been on the increase. It needs but on the one hand to consider how impossible it is for the savage, even with ore and coal ready, to produce so simple a thing as an iron hatchet; and then to consider, on the other hand, that it would have been impracticable among ourselves, even a century ago, to raise the tubes of the Britannia bridge from lack of the hydraulic press; to see how mutually dependent are the arts, and how all must advance that each may advance. Well, the sciences are involved with each other in just the same manner. They are, in fact, inextricably woven into this same complex web of the arts; and are only conventionally independent of it. Originally the two were one. How to fix the religious festivals; when to sow; how to weigh commodities; and in what manner to measure ground; were the purely practical questions out of which arose astronomy, mechanics, geometry. Since then there has been a perpetual inosculation of the sciences and the arts. Science has been supplying art with truer generalizations and more completely quantitative previsions. Art has been supplying science with better materials, and more perfect instruments. And all along the interdependence has been growing closer, not only between art and science, but among the arts themselves, and among the sciences themselves. How completely the analogy holds throughout, becomes yet clearer when we recognize the fact that *the sciences are arts to one another*. If, as occurs in almost every case, the fact to be analyzed by any science, has first to be prepared—to be disentangled from disturbing facts by the afore discovered methods of other sciences; the other sciences so used, stand in the position of arts. If, in solving a dynamical problem, a parallelogram is drawn, of which the sides and diagonal represent forces, and by putting magnitudes of extension for magnitudes of force a measurable relation is established between quantities not else to be dealt with; it may be fairly said that geometry plays towards mechanics much the same part that the fire of the founder plays towards the metal he is going to cast. If, in analyzing the phenomena of the coloured rings surrounding the point of contact between two lenses, a Newton ascertains by calculation the amount of certain interposed spaces, far too minute for actual measurement; he employs the science of number for essentially the same purpose as that for which the watchmaker employs tools. If, before calculating the orbit of a comet from its observed position, the astronomer has to separate all the errors of observation, it is manifest that the refraction-tables, and

logarithm-books, and formulæ, which he successively uses, serve him much as retorts, and filters, and cupels serve the assayer who wishes to separate the pure gold from all accompanying ingredients. So close, indeed, is the relationship, that it is impossible to say where science begins and art ends. All the instruments of the natural philosopher are the products of art; the adjusting one of them for use is an art; there is art in making an observation with one of them; it requires art properly to treat the facts ascertained; nay, even the employing established generalizations to open the way to new generalizations, may be considered as art. In each of these cases previously organized knowledge becomes the implement by which new knowledge is got at: and whether that previously organized knowledge is embodied in a tangible apparatus or in a formula, matters not in so far as its essential relation to the new knowledge is concerned. If art is applied knowledge, then such portion of a scientific investigation as consists of applied knowledge is art. Hence we may even say that as soon as any prevision in science passes out of its originally passive state, and is employed for reaching other previsions, it passes from theory into practice—becomes science in action—becomes art. And after contemplating these facts, we shall the more clearly perceive that as the connexion of the arts with each other has been becoming more intimate; as the help given by sciences to arts and by arts to sciences, has been age by age increasing; so the interdependence of the sciences themselves has been ever growing greater, their relations more involved, their *consensus* more active.

In here ending our sketch of the Genesis of Science, we are conscious of having done the subject but scant justice. Two difficulties have stood in our way: one, the having to touch on so many points in such small space; the other, the necessity of treating in serial arrangement a process which is not serial. Nevertheless, we believe the evidence assigned suffices to substantiate the leading propositions with which we set out. Inquiry into the first stages of science confirms the conclusion drawn from analysis of science as now existing, that it is not distinct from common knowledge, but an outgrowth from it—an extension of perception by means of reason. That more specific characteristic of scientific previsions, which was analytically shown to distinguish them from the previsions of uncultured intelligence—their quantitativeness—we also see to have been the characteristic alike of the initial steps in science, and of all the steps succeeding them. The facts and admissions cited in disproof of the assertion that the sciences follow one another, both logically and historically, in the order of their decreasing generality, have been enforced by the instances we have met with, showing that a more general science as much owes its progress to the presentation of new problems by a more special science, as the more special science owes its progress to the solutions which the more general science is thus led to attempt—instances, therefore, illustrating the position that scientific advance is as much from the special to the general as from the general to the special. Quite in harmony with this position we find to be the admissions that the sciences are as branches of one trunk, and that they were at first cultivated simultaneously. This harmony becomes the more marked on finding, as we have done, not only that the sciences have a common root, but that science in general has a common root with language, classification, reasoning, art; that throughout civilization these have advanced together, acting and reacting upon each other just as the separate sciences have done; and that thus the development of intelligence in all its divisions and sub-divisions has conformed to this same law which we have shown that the sciences conform to. From all which we may perceive that the sciences can with no greater propriety be arranged

in a succession, than language, classification, reasoning, art, and science, can be arranged in a succession; that, however needful a succession may be for the convenience of books and catalogues, it must be recognized as merely a convention; and that so far from its being the function of a philosophy of the sciences to establish a hierarchy, it is its function to show that the linear arrangements required for literary purposes, have none of them any basis either in Nature or History.

There is one further remark we must not omit—a remark touching the importance of the question that has been discussed. Topics of this abstract nature are commonly slighted as of no practical moment; and, doubtless, many will think it of little consequence what theory respecting the genesis of science may be entertained. But the value of truths is often great, in proportion as their generality is wide. And it must be so here. A correct theory of the development of the sciences must have an important effect on education; and, through education, on civilization. Much as we differ from him in other respects, we agree with M. Comte in the belief that, rightly conducted, the education of the individual must have a certain correspondence with the evolution of the race. No one can contemplate the facts we have cited in illustration of the early stages of science, without recognizing the *necessity* of the processes through which those stages were reached—a necessity which, in respect to the leading truths, may likewise be traced in all after stages. This necessity, originating in the very nature of the phenomena to be analyzed and the faculties to be employed, partially applies to the mind of the child as to that of the savage. We say partially, because the correspondence is not special but general only. Were the *environment* the same in both cases, the correspondence would be complete. But though the surrounding material out of which science is to be organized, is, in many cases, the same to the juvenile mind and the aboriginal mind, it is not so throughout; as, for instance, in the case of chemistry, the phenomena of which are accessible to the one, but were inaccessible to the other. Hence, in proportion as the environment differs, the course of evolution must differ. After admitting exceptions, however, there remains a substantial parallelism; and, if so, it is of moment to ascertain what really has been the process of scientific evolution. The establishment of an erroneous theory must be disastrous in its educational results; while the establishment of a true one must be fertile in school-reforms and consequent social benefits.

MORALS AND MORAL SENTIMENTS

(1871)

IF a writer who discusses unsettled questions takes up every gauntlet thrown down to him, polemical writing will absorb much of his energy. Having a power of work which unfortunately does not suffice for executing with anything like due rapidity the task I have undertaken, I have made it a policy to avoid controversy as much as possible, even at the cost of being seriously misunderstood. Hence it resulted that when in *Macmillan's Magazine*, for July, 1869, Mr. Richard Hutton published, under the title of "A Questionable Parentage for Morals," a criticism on a doctrine of mine, I decided to let his misrepresenta-

tions pass unnoticed until, in the course of my work, I arrived at the stage where, by a full exposition of this doctrine, they would be set aside. It did not occur to me that, in the meantime, these erroneous statements, accepted as true statements, would be repeated by other writers, and my views commented upon as untenable. This, however, has happened. In more periodicals than one, I have seen it asserted that Mr. Hutton has effectually disposed of my hypothesis. Supposing that this hypothesis has been rightly expressed by Mr. Hutton, Sir John Lubbock, in his *Origin of Civilisation*, &c., has been led to express a partial dissent; which I think he would not have expressed had my own exposition been before him. Mr. Mivart, too, in his recent *Genesis of Species*, has been similarly betrayed into misapprehensions. And now Sir Alexander Grant, following the same lead, has conveyed to the readers of the *Fortnightly Review* another of these conceptions, which is but very partially true. Thus I find myself compelled to say as much as will serve to prevent further spread of the mischief.

If a general doctrine concerning a highly-involved class of phenomena could be adequately presented in a single paragraph of a letter, the writing of books would be superfluous. In the brief exposition of certain ethical doctrines held by me, which is given in Professor Bain's *Mental and Moral Science*, it is stated that they are—

> as yet, nowhere fully expressed. They form part of the more general doctrine of Evolution which he is engaged in working out; and they are at present to be gathered only from scattered passages. It is true that, in his first work, *Social Statics*, he presented what he then regarded as a tolerably complete view of one division of Morals. But without abandoning this view, he now regards it as inadequate—more especially in respect of its basis.

Mr. Hutton, however, taking the bare enunciation of one part of this basis, deals with it critically; and, in the absence of any exposition by me, sets forth what he supposes to be my grounds for it, and proceeds to show that they are unsatisfactory.

If, in his anxiety to suppress what he doubtless regards as a pernicious doctrine, Mr. Hutton could not wait until I had explained myself, it might have been expected that he would use whatever information was to be had concerning it. So far from seeking out such information, however, he has, in a way for which I cannot account, ignored the information immediately before him.

The title which Mr. Hutton has chosen for his criticism is, "A Questionable Parentage for Morals." Now he has ample means of knowing that I allege a primary basis of Morals, quite independent of that which he describes and rejects. I do not refer merely to the fact that having, when he reviewed *Social Statics*,[1] expressed his very decided dissent from this primary basis, he must have been aware that I alleged it; for he may say that in the many years which have since elapsed he had forgotten all about it. But I refer to the distinct enunciation of this primary basis in that letter to Mr. Mill from which he quotes. In a preceding paragraph of the letter, I have explained that, while I accept utilitarianism in the abstract, I do not accept that current utilitarianism which recognizes for the guidance of conduct nothing beyond empirical generalizations; and I have contended that—

> Morality, properly so-called—the science of right conduct—has for its object to determine *how* and *why* certain modes of conduct are detrimental, and certain other modes beneficial. These good and bad results cannot be accidental, but must be necessary consequences of the constitution of things; and I conceive it to be the business of Moral Science to deduce, from the laws of life and the conditions of existence, what kinds of action necessarily tend to produce happiness, and what kinds to produce unhappiness. Having done this, its deductions are to be recognised as laws of conduct; and are to be conformed to irrespective of a direct estimation of happiness or misery.

Nor is this the only enunciation of what I conceive to be the primary basis

[1] See *Prospective Review* for January, 1852.

of morals, contained in this same letter. A subsequent paragraph separated by four lines only from that which Mr. Hutton extracts, commences thus :—

Progressing civilization, which is of necessity a succession of compromises between old and new, requires a perpetual re-adjustment of the compromise between the ideal and the practicable in social arrangements: to which end, both elements of the compromise must be kept in view. If it is true that pure rectitude prescribes a system of things far too good for men as they are, it is not less true that mere expediency does not of itself tend to establish a system of things any better than that which exists. While absolute morality owes to expediency the checks which prevent it from rushing into Utopian absurdities, expediency is indebted to absolute morality for all stimulus to improvement. Granted that we are chiefly interested in ascertaining what is *relatively right*, it still follows that we must first consider what is *absolutely right;* since the one conception pre-supposes the other.

I do not see how there could well be a more emphatic assertion that there exists a primary basis of morals independent of, and in a sense antecedent to, that which is furnished by experiences of utility; and consequently, independent of, and in a sense antecedent to, those moral sentiments which I conceive to be generated by such experiences. Yet no one could gather from Mr. Hutton's article that I assert this; or would even find reasons for a faint suspicion that I do so. From the reference made to my further views, he would infer my acceptance of that empirical utilitarianism which I have expressly repudiated. And the title which Mr. Hutton gives to his paper clearly asserts, by implication, that I recognize no "parentage for morals" beyond that of the accumulation and organisation of the effects of experience. I cannot believe that Mr. Hutton intended to convey this erroneous impression. He was, I suppose, too much absorbed in contemplating the proposition he combats to observe, or, at least, to attach any weight to, the propositions which accompany it. But I am sorry he did not perceive the mischief he was likely to do me by spreading this one-sided statement.

I pass now to the particular question at issue — not the "parentage for morals," but the parentage of moral sentiments. In describing my view on this more special doctrine, Mr. Hutton has similarly, I regret to say, neglected the data which would have helped him to draw an approximately true outline of it. It cannot well be that the existence of such data was unknown to him. They are contained in the *Principles of Psychology;* and Mr. Hutton reviewed that work when it was first published.[1] In a chapter on the Feelings, which occurs near the end of it, there is sketched out a process of evolution by no means like that which Mr. Hutton indicates; and had he turned to that chapter he would have seen that his description of the genesis of moral sentiments out of organized experiences is not such a one as I should have given. Let me quote a passage from that chapter :—

Not only are those emotions which form the immediate stimuli to actions, thus explicable; but the like explanation applies to the emotions that leave the subject of them comparatively passive: as, for instance, the emotion produced by beautiful scenery. The gradually increasing complexity in the groups of sensations and ideas co-ordinated, ends in the co-ordination of those vast aggregations of them which a grand landscape excites and suggests. The infant taken into the midst of mountains, is totally unaffected by them; but is delighted with the small group of attributes and relations presented in a toy. The child can appreciate, and be pleased with, the more complicated relations of household objects and localities, the garden, the field, and the street. But it is only in youth and mature age, when individual things and small assemblages of them have become familiar and automatically cognizable, that those immense assemblages which landscapes present can be adequately grasped, and the highly aggregated states of consciousness produced by them, experienced. Then, however, the various minor groups of states that have been in earlier days severally produced by trees, by fields, by

[1] His criticism will be found in the *National Review* for January, 1856, under the title "Atheism."

streams, by cascades, by rocks, by precipices, by mountains, by clouds, are aroused together. Along with the sensations immediately received, there are partially excited the myriads of sensations that have been in times past received from objects such as those presented; further, there are partially excited the various incidental feelings that were experienced on all these countless past occasions; and there are probably also excited certain deeper, but now vague combinations of states, that were organized in the race during barbarous times, when its pleasurable activities were chiefly among the woods and waters. And out of all these excitations, some of them actual but most of them nascent, is composed the emotion which a fine landscape produces in us.

It is, I think, amply manifest that the processes here indicated are not to be taken as intellectual processes—not as processes in which recognized relations between pleasures and their antecedents, or intelligent adaptations of means to ends, form the dominant elements. The state of mind produced by an aggregate of picturesque objects is not one resolvable into propositions. The sentiment does not contain within itself any consciousness of causes and consequences of happiness. The vague recollections of other beautiful scenes and other delightful days which it dimly rouses, are not aroused because of any rational co-ordinations of ideas that have been formed in bygone years. Mr. Hutton, however, assumes that in speaking of the genesis of moral feelings as due to inherited experiences of the pleasures and pains caused by certain modes of conduct, I am speaking of reasoned-out experiences—experiences consciously accumulated and generalized. He overlooks the fact that the genesis of emotions is distinguished from the genesis of ideas in this; that whereas the ideas are composed of elements that are simple, definitely related, and (in the case of general ideas) constantly related, emotions are composed of enormously complex aggregates of elements that are never twice alike, and which stand in relations that are never twice alike. The difference in the resulting modes of consciousness is this:—In the genesis of an idea the successive experiences, be they of sounds, colours, touches, tastes, or be they of the special objects which combine many of these into groups, have so much in common that each, when it occurs, can be definitely thought of as like those which preceded it. But in the genesis of an emotion the successive experiences so far differ that each of them, when it occurs, suggests past experiences which are not specifically similar, but have only a general similarity; and, at the same time, it suggests benefits or evils in past experience which likewise are various in their special natures, though they have a certain community in general nature. Hence it results that the consciousness aroused is a multitudinous, confused consciousness, in which, along with a certain kind of combination among the impressions received from without, there is a vague cloud of ideal combinations akin to them, and a vague mass of ideal feelings of pleasure or pain which were associated with these. We have abundant proof that feelings grow up without reference to recognized causes and consequences, and without the possessor of them being able to say why they have grown up; though analysis, nevertheless, shows that they have been formed out of connected experiences. The familiar fact that a kind of jam which was, during childhood, repeatedly taken after medicine, may become, by simple association of sensations, so nauseous that it cannot be tolerated in after-life, illustrates clearly the way in which repugnances may be established by habitual association of feelings, without any belief in causal connexion; or rather, in spite of the knowledge that there is no causal connexion. Similarly with pleasurable emotions. The cawing of rooks is not in itself an agreeable sound: musically considered, it is very much the contrary. Yet the cawing of rooks usually produces in people feelings of a grateful kind—feelings which most of them suppose to result from the quality of the sound itself. Only the few who are given to self-analysis are aware that

the cawing of rooks is agreeable to them because it has been connected with countless of their greatest gratifications—with the gathering of wild flowers in childhood; with Saturday-afternoon excursions in school-boy days; with midsummer holidays in the country, when books were thrown aside and lessons were replaced by games and adventures in the fields; with fresh, sunny mornings in after years, when a walking excursion was an immense relief from toil. As it is, this sound, though not causally related to all these multitudinous and varied past delights, but only often associated with them, can no more be heard without rousing a dim consciousness of these delights, than the voice of an old friend unexpectedly coming into the house can be heard without suddenly raising a wave of that feeling that has resulted from the pleasures of past companionship. If we are to understand the genesis of emotions, either in the individual or in the race, we must take account of this all-important process. Mr. Hutton, however, apparently overlooking it, and not having reminded himself, by referring to the *Principles of Psychology*, that I insist upon it, represents my hypothesis to be that a certain sentiment results from the consolidation of intellectual conclusions! He speaks of me as believing that "what seem to us now the 'necessary' intuitions and *a priori* assumptions of human nature, are likely to prove, when scientifically analysed, nothing but a similar conglomeration of our ancestors' *best observations and most useful empirical rules.*" He supposes me to think that men having, in past times, come to *see* that truthfulness was useful, "the habit of approving truth-speaking and fidelity to engagements, which was first based on this ground of utility, became so rooted, that the utilitarian ground of it was forgotten, and *we* find ourselves springing to the belief in truth-speaking and fidelity to engagements from an inherited tendency." Similarly throughout, Mr. Hutton has so used the word "utility," and so interpreted it on my behalf, as to make me appear to mean that moral sentiment is formed out of *conscious generalizations* respecting what is beneficial and what detrimental. Were such my hypothesis, his criticisms would be very much to the point; but as such is not my hypothesis, they fall to the ground. The experiences of utility I refer to are those which become registered, not as distinctly recognized connexions between certain kinds of acts and certain kinds of remote results, but those which become registered in the shape of associations between groups of feelings that have often recurred together, though the relation between them has not been consciously generalized—associations the origin of which may be as little perceived as is the origin of the pleasure given by the sounds of a rookery; but which, nevertheless, have arisen in the course of daily converse with things, and serve as incentives or deterrents.

In the paragraph which Mr. Hutton has extracted from my letter to Mr. Mill, I have indicated an analogy between those effects of emotional experiences out of which I believe moral sentiments have been developed, and those effects of intellectual experiences out of which I believe space-intuitions have been developed. Rightly considering that the first of these hypotheses cannot stand if the last is disproved, Mr. Hutton has directed part of his attack against this last. But would it not have been well if he had referred to the *Principles of Psychology*, where this last hypothesis is set forth at length, before criticising it? Would it not have been well to give an abstract of my own description of the process, instead of substituting what he *supposes* my description must be? Any one who turns to the *Principles of Psychology* (first edition, pp. 218–245), and reads the two chapters, "The Perception of Body as presenting Statical Attributes," and "The Perception of Space," will find that Mr. Hutton's account of my view on this matter has

given him no notion of the view as it is expressed by me; and will, perhaps, be less inclined to smile than he was when he read Mr. Hutton's account. I cannot here do more than thus imply the invalidity of such part of Mr. Hutton's argument as proceeds upon this incorrect representation. The pages which would be required for properly explaining the doctrine that space-intuitions result from organized experiences may be better used for explaining this analogous doctrine at present before us. This I will now endeavour to do; not indirectly by correcting misapprehensions, but directly by an exposition which shall be as brief as the extremely involved nature of the process allows.

An infant in arms, when old enough to gaze at objects around with some vague recognition, smiles in response to the laughing face and soft caressing voice of its mother. Let there come some one who, with an angry face, speaks to it in loud, harsh tones. The smile disappears, the features contract into an expression of pain, and, beginning to cry, it turns away its head, and makes such movements of escape as are possible. What is the meaning of these facts? Why does not the frown make it smile, and the mother's laugh make it weep? There is but one answer. Already in its developing brain there is coming into play the structure through which one cluster of visual and auditory impressions excites pleasurable feelings, and the structure through which another cluster of visual and auditory impressions excites painful feelings. The infant knows no more about the relation existing between a ferocious expression of face, and the evils which may follow perception of it, than the young bird just out of its nest knows of the possible pain and death which may be inflicted by a man coming towards it; and as certainly in the one case as in the other, the alarm felt is due to a partially-established nervous structure. Why does this partially-established nervous structure betray its presence thus early in the human being? Simply because, in the past experiences of the human race, smiles and gentle tones in those around have been the habitual accompaniments of pleasurable feelings; while pains of many kinds, immediate and more or less remote, have been continually associated with the impressions received from knit brows, and set teeth, and grating voice. Much deeper down than the history of the human race must we go to find the beginnings of these connexions. The appearances and sounds which excite in the infant a vague dread, indicate danger; and do so because they are the physiological accompaniments of destructive action—some of them common to man and inferior mammals, and consequently understood by inferior mammals, as every puppy shows us. What we call the natural language of anger, is due to a partial contraction of those muscles which actual combat would call into play; and all marks of irritation, down to that passing shade over the brow which accompanies slight annoyance, are incipient stages of these same contractions. Conversely with the natural language of pleasure, and of that state of mind which we call amicable feeling: this, too, has a physiological interpretation.[1]

Let us pass now from the infant in arms to the children in the nursery. What have the experiences of each been doing in aid of the emotional development we are considering? While its limbs have been growing more agile by exercise, its manipulative skill increasing by practice, its perceptions of objects growing by use quicker, more accurate, more comprehensive; the associations between these two sets of impressions received from those around, and the pleasures and pains received along with them, or after them, have been by

[1] Hereafter I hope to elucidate at length these phenomena of expression. For the present, I can refer only to such further indications as are contained in two essays on "The Physiology of Laughter" and "The Origin and Function of Music."

frequent repetition made stronger, and their adjustments better. The dim sense of pain and the vague glow of delight which the infant felt, have, in the urchin, severally taken shapes that are more definite. The angry voice of a nursemaid no longer arouses only a formless feeling of dread, but also a specific idea of the slap that may follow. The frown on the face of a bigger brother, along with the primitive, indefinable sense of ill, brings the ideas of ills that are definable as kicks, and cuffs, and pullings of hair, and losses of toys. The faces of parents, looking now sunny, now gloomy, have grown to be respectively associated with multitudinous forms of gratification and multitudinous forms of discomfort or privation. Hence these appearances and sounds, which imply amity or enmity in those around, become symbolic of happiness and misery; so that eventually, perception of the one set or the other can scarcely occur without raising a wave of pleasurable feeling or of painful feeling. The body of this wave is still substantially of the same nature as it was at first; for though in each of these multitudinous experiences a special set of facial and vocal signs has been connected with a special set of pleasures or pains; yet since these pleasures or pains have been immensely varied in their kinds and combinations, and since the signs that preceded them were in no two cases quite alike, it results that even to the end the consciousness produced remains as vague as it is voluminous. The thousands of partially-aroused ideas resulting from past experiences are massed together and superposed, so as to form an aggregate in which nothing is distinct, but which has the character of being pleasurable or painful according to the nature of its original components: the chief difference between this developed feeling and the feeling aroused in the infant being, that on bright or dark background forming the body of it, may now be sketched out in thought the particular pleasures or pains which the particular circumstances suggest as likely.

What must be the working of this process under the conditions of aboriginal life? The emotions given to the young savage by the natural language of love and hate in the members of his tribe, gain first a partial definiteness in respect to his intercourse with his family and playmates; and he learns by experience the utility, in so far as his own ends are concerned, of avoiding courses which call from others manifestations of anger, and taking courses which call from them manifestations of pleasure. Not that he consciously generalizes. He does not at that age, probably not at any age, formulate his experiences in the general principle that it is well for him to do things which bring smiles, and to avoid doing things which bring frowns. What happens is that having, in the way shown, inherited this connexion between the perception of anger in others and the feeling of dread, and having discovered that certain acts of his bring on this anger, he cannot subsequently think of committing one of these acts without thinking of the resulting anger and feeling more or less of the resulting dread. He has no thought of the utility or inutility of the act itself: the deterrent is the mainly vague, but partially definite, fear of evil that may follow. So understood, the deterring emotion is one which has grown out of experiences of utility, using that word in its ethical sense; and if we ask why this dreaded anger is called forth from others, we shall habitually find that it is because the forbidden act entails pain somewhere—is negatived by utility. On passing from domestic injunctions to injunctions current in the tribe, we see no less clearly how these emotions produced by approbation and reprobation come to be connected in experience with actions which are beneficial to the tribe, and actions which are detrimental to the tribe; and how there consequently grow up incentives to the one class of actions and prejudices against the other class. From early boyhood

the young savage hears recounted the daring deeds of his chief—hears them in words of praise, and sees all faces glowing with admiration. From time to time also he listens while some one's cowardice is described in tones of scorn, and with contemptuous metaphors, and sees him meet with derision and insult whenever he appears. That is to say, one of the things that come to be associated in his mind with smiling faces, which are symbolical of pleasures in general, is courage; and one of the things that come to be associated in his mind with frowns and other marks of enmity, which form his symbol of unhappiness, is cowardice. These feelings are not formed in him because he has reasoned his way to the truth that courage is useful to the tribe, and, by implication, to himself, or to the truth that cowardice is a cause of evil. In adult life he may perhaps see this; but he certainly does not see it at the time when bravery is thus joined in his consciousness with all that is good, and cowardice with all that is bad. Similarly there are produced in him feelings of inclination or repugnance towards other lines of conduct that have become established or interdicted, because they are beneficial or injurious to the tribe; though neither the young nor the adults know why they have become established or interdicted. Instance the praiseworthiness of wife-stealing, and the viciousness of marrying within the tribe.

We may now ascend a stage to an order of incentives and restraints derived from these. The primitive belief is that every dead man becomes a demon, who is often somewhere at hand, may at any moment return, may give aid or do mischief, and has to be continually propitiated. Hence, among other agents whose approbation or reprobation are contemplated by the savage as consequences of his conduct, are the spirits of his ancestors. When a child he is told of their deeds, now in triumphant tones, now in whispers of horror; and the instilled belief that they may inflict some vaguely-imagined but fearful evil, or give some great help, becomes a powerful incentive or deterrent. Especially does this happen when the story is of a chief, distinguished for his strength, his ferocity, his persistence in that revenge on enemies which the experiences of the savage make him regard as beneficial and virtuous. The consciousness that such a chief, dreaded by neighbouring tribes, and dreaded, too, by members of his own tribe, may reappear and punish those who have disregarded his injunctions, becomes a powerful motive. But it is clear, in the first place, that the imagined anger and the imagined satisfaction of this deified chief, are simply transfigured forms of the anger and satisfaction displayed by those around; and that the feelings accompanying such imaginations have the same original root in the experiences which have associated an average of painful results with the manifestation of another's anger, and an average of pleasurable results with the manifestation of another's satisfaction. And it is clear, in the second place, that the actions thus forbidden and encouraged must be mostly actions that are respectively detrimental and beneficial to the tribe; since the successful chief is usually a better judge than the rest, and has the preservation of the tribe at heart. Hence experiences of utility, consciously or unconsciously organized, underlie his injunctions; and the sentiments which prompt obedience are, though very indirectly and without the knowledge of those who feel them, referable to experiences of utility.

This transfigured form of restraint, differing at first but little from the original form, admits of immense development. Accumulating traditions, growing in grandeur as they are repeated from generation to generation, make more and more superhuman the early-recorded hero of the race. His powers of inflicting punishment and giving happiness become ever greater, more multitudinous, and more varied; so that the dread of divine displeasure, and the

desire to obtain divine approbation, acquire a certain largeness and generality. Still the conceptions remain anthropomorphic. The revengeful deity continues to be thought of in terms of human emotions, and continues to be represented as displaying these emotions in human ways. Moreover, the sentiments of right and duty, so far as they have become developed, refer mainly to divine commands and interdicts; and have little reference to the natures of the acts commanded or interdicted. In the intended offering-up of Isaac, in the sacrifice of Jephthah's daughter, and in the hewing to pieces of Agag, as much as in the countless atrocities committed from religious motives by various early historic races, as by some existing savage races, we see that the morality and immorality of actions, as we understand them, are at first little recognized; and that the feelings, chiefly of dread, which serve in place of them, are feelings felt towards the unseen beings supposed to issue the commands and interdicts.

Here it will be said that, as just admitted, these are not the moral sentiments properly so called. They are simply sentiments that precede and make possible those highest sentiments which do not refer either to personal benefits or evils to be expected from men, or to more remote rewards and punishments. Several comments are, however, called forth by this criticism. One is, that if we glance back at past beliefs and their correlative feelings, as shown in Dante's poem, in the mystery-plays of the middle ages, in St. Bartholomew massacres, in burnings for heresy, we get proof that in comparatively modern times right and wrong meant little else than subordination or insubordination—to a divine ruler primarily, and under him to a human ruler. Another is, that down to our own day this conception largely prevails, and is even embodied in elaborate ethical works—instance the *Essays on the Principles of Morality*, by Jonathan Dymond, which recognises no ground of moral obligation save the will of God as expressed in the current creed. And yet a further is, that while in sermons the torments of the damned and the joys of the blessed are set forth as the dominant deterrents and incentives, and while we have prepared for us printed instructions "how to make the best of both worlds," it cannot be denied that the feelings which impel and restrain men are still largely composed of elements like those operative on the savage: the dread, partly vague, partly specific, associated with the idea of reprobation, human and divine.

But during the growth of that civilization which has been made possible by these ego-altruistic sentiments, there have been slowly evolving the altruistic sentiments. Development of these has gone on only as fast as society has advanced to a state in which the activities are mainly peaceful. The root of all the altruistic sentiments is sympathy; and sympathy could become dominant only when the mode of life, instead of being one that habitually inflicted direct pain, became one which conferred direct and indirect benefits: the pains inflicted being mainly incidental and indirect. Adam Smith made a large step towards this truth when he recognized sympathy as giving rise to these superior controlling emotions. His *Theory of Moral Sentiments*, however, requires to be supplemented in two ways. The natural process by which sympathy becomes developed into a more and more important element of human nature has to be explained; and there has also to be explained the process by which sympathy produces the highest and most complex of the altruistic sentiments—that of justice. Respecting the first process, I can here do no more than say that sympathy may be proved, both inductively and deductively, to be the concomitant of gregariousness: the two having all along increased by reciprocal aid. Multiplication has ever tended to force into an association, more or less close, all

creatures having kinds of food and supplies of food that permit association; and established psychological laws warrant the inference that some sympathy will inevitably result from habitual manifestations of feelings in presence of one another, and that the gregariousness being augmented by the increase of sympathy, further facilitates the development of sympathy. But there are negative and positive checks upon this development—negative, because sympathy cannot advance faster than intelligence advances, since it presupposes the power of interpreting the natural language of the various feelings, and of mentally representing those feelings; positive, because the immediate needs of self-preservation are often at variance with its promptings, as, for example, during the predatory stages of human progress. For explanations of the second process, I must refer to the *Principles of Psychology* (§ 202, first edition, and § 215, second edition) and to *Social Statics*, part ii., chapter v.[1] Asking that in default of space these explanations may be taken for granted, let me here point out in what sense even sympathy, and the sentiments that result from it, are due to experiences of utility. If we suppose all thought of rewards or punishments, immediate or remote, to be left out of consideration, it is clear that any one who hesitates to inflict a pain because of the vivid representation of that pain which rises in his consciousness, is restrained, not by any sense of obligation or by any formulated doctrine of utility, but by the painful association established in him. And it is clear that if, after repeated experiences of the moral discomfort he has felt from witnessing the unhappiness indirectly caused by some of his acts, he is led to check himself when again tempted to those acts, the restraint is of like nature. Conversely with the pleasure-giving acts: repetitions of kind deeds, and experiences of the sympathetic gratifications that follow, tend continually to make stronger the association between such deeds and feelings of happiness.

Eventually these experiences may be consciously generalized, and there may result a deliberate pursuit of sympathetic gratifications. There may also come to be distinctly recognized the truths that the remoter results, kind and unkind conduct, are respectively beneficial and detrimental—that due regard for others is conducive to ultimate personal welfare, and disregard of others to ultimate personal disaster; and then there may become current such summations of experience as "honesty is the best policy." But so far from regarding these intellectual recognitions of utility as preceding and causing the moral sentiment, I regard the moral sentiment as preceding such recognitions of utility, and making them possible. The pleasures and pains directly resulting in experience from sympathetic and unsympathetic actions, had first to be slowly associated with such actions, and the resulting incentives and deterrents frequently obeyed, before there could arise the perceptions that sympathetic and unsympathetic actions are remotely beneficial or detrimental to the actor; and they had to be obeyed still longer and more generally before there could arise the perceptions that they are socially beneficial or detrimental. When, however, the remote effects, personal and social, have gained general recognition, are expressed in current maxims, and lead to injunctions having the religious sanction, the sentiments that prompt sympathetic actions and check unsympathetic ones are immensely strengthened by their alliances. Approbation and reprobation, divine and human, come to be associated in thought with the sympathetic and unsympathetic actions respectively. The commands of the creed,

[1] I may add that in *Social Statics*, chap. xxx., I have indicated in a general way, the causes of the development of sympathy and the restraints upon its development—confining the discussion, however, to the case of the human race, my subject limiting me to that. The accompanying teleology I now disclaim.

the legal penalties, and the code of social conduct, unitedly enforce them; and every child as it grows up, daily has impressed on it by the words and faces and voices of those around the authority of these highest principles of conduct. And now we may see why there arises a belief in the special sacredness of these highest principles, and a sense of the supreme authority of the altruistic sentiments answering to them. Many of the actions which, in early social stages, received the religious sanction and gained public approbation, had the drawback that such sympathies as existed were outraged, and there was hence an imperfect satisfaction. Whereas these altruistic actions, while similarly having the religious sanction and gaining public approbation, bring a sympathetic consciousness of pleasure given or of pain prevented; and, beyond this, bring a sympathetic consciousness of human welfare at large, as being furthered by making altruistic actions habitual. Both this special and this general sympathetic consciousness become stronger and wider in proportion as the power of mental representation increases, and the imagination of consequences, immediate and remote, grows more vivid and comprehensive. Until at length these altruistic sentiments begin to call in question the authority of those ego-altruistic sentiments which once ruled unchallenged. They prompt resistance to laws that do not fulfil the conception of justice, encourage men to brave the frowns of their fellows by pursuing a course at variance with customs that are perceived to be socially injurious, and even cause dissent from the current religion; either to the extent of disbelief in those alleged divine attributes and acts not approved by this supreme moral arbiter, or to the extent of entire rejection of a creed which ascribes such attributes and acts.

Much that is required to make this hypothesis complete must stand over until, at the close of the second volume of the *Principles of Psychology*, I have space for a full exposition. What I have said will make it sufficiently clear that two fundamental errors have been made in the interpretation put upon it. Both Utility and Experience have been construed in senses much too narrow. Utility, convenient a word as it is from its comprehensiveness, has very inconvenient and misleading implications. It vividly suggests uses, and means, and proximate ends, but very faintly suggests the pleasures, positive or negative, which are the ultimate ends, and which, in the ethical meaning of the word, are alone considered; and, further, it implies conscious recognition of means and ends—implies the deliberate taking of some course to gain a perceived benefit. Experience, too, in its ordinary acceptation, connotes definite perceptions of causes and consequences, as standing in observed relations, and is not taken to include the connexions formed in consciousness between states that recur together, when the relation between them, causal or other, is not perceived. It is in their widest senses, however, that I habitually use these words, as will be manifest to every one who reads the *Principles of Psychology*; and it is in their widest senses that I have used them in the letter to Mr. Mill. I think I have shown above that, when they are so understood, the hypothesis briefly set forth in that letter is by no means so indefensible as is supposed. At any rate, I have shown—what seemed for the present needful to show—that Mr. Hutton's versions of my views must not be accepted as correct.

MANNERS AND FASHION

(1854)

WHOEVER has studied the physiognomy of political meetings, cannot fail to have remarked a connexion between democratic opinions and peculiarities of costume. At a Chartist demonstration, a lecture on Socialism, or a *soirée* of the Friends of Italy, there will be seen many among the audience, and a still larger ratio among the speakers, who get themselves up in a style more or less unusual. One gentleman on the platform divides his hair down the centre, instead of on one side; another brushes it back off the forehead, in the fashion known as "bringing out the intellect"; a third has so long forsworn the scissors, that his locks sweep his shoulders. A sprinkling of moustaches may be observed; here and there an imperial; and occasionally some courageous breaker of conventions exhibits a full-grown beard.[1] This nonconformity in hair is countenanced by various nonconformities in dress, shown by others of the assemblage. Bare necks, shirt collars *à la* Byron, waistcoats cut Quaker fashion, wonderfully shaggy great coats, numerous oddities in form and colour, destroy the monotony usual in crowds. Even those exhibiting no conspicuous peculiarity, frequently indicate by something in the pattern of their clothes, that they pay small regard to what their tailors tell them about the prevailing taste. And when the gathering breaks up, the varieties of head gear displayed—the number of caps, and the abundance of felt hats—suffice to prove that were the world at large like-minded, the black cylinders which tyrannize over us would soon be deposed.

This relationship between political discontent and disregard of customs exists on the Continent also. Red republicanism is everywhere distinguished by its hirsuteness. The authorities of Prussia, Austria, and Italy, alike recognize certain forms of hat as indicative of disaffection, and fulminate against them accordingly. In some places the wearer of a blouse runs a risk of being classed among the *suspects*; and in others, he who would avoid the bureau of police must beware how he goes out in any but the ordinary colours. Thus, democracy abroad, as at home, tends towards personal singularity. Nor is this association of characteristics peculiar to modern times, or to reformers of the State. It has always existed; and it has been manifested as much in religious agitations as in political ones. The Puritans, disapproving of the long curls of the Cavaliers, as of their principles, cut their own hair short, and so gained the name of "Roundheads." The marked religious nonconformity of the Quakers was accompanied by an equally-marked nonconformity of manners—in attire, in speech, in salutation. The early Moravians not only believed differently, but at the same time dressed differently, and lived differently, from their fellow Christians. That the association between political independence and independence of personal conduct is not a phenomenon of to-day only, we may see alike in the appearance of Franklin at the French court in plain clothes, and in the white hats worn by the last generation of radicals. Originality of nature is sure to show itself in more ways than one. The mention of George Fox's suit of leather, or Pestalozzi's school name, "Harry Oddity," will at once suggest the remembrance that men who have in great things diverged from the beaten track, have frequently done so in small things likewise. Minor illustrations may be

[1] This was written before moustaches and beards had become general.

gathered in almost every circle. We believe that whoever will number up his reforming and rationalist acquaintances, will find among them more than the usual proportion of those who in dress or behaviour exhibit some degree of what the world calls eccentricity.

If it be a fact that men of revolutionary aims in politics or religion are commonly revolutionists in custom also, it is not less a fact that those whose office it is to uphold established arrangements in State and Church, are also those who most adhere to the social forms and observances bequeathed to us by past generations. Practices elsewhere extinct still linger about the head quarters of government. The monarch still gives assent to Acts of Parliament in the old French of the Normans; and Norman French terms are still used in law. Wigs, such as those we see depicted in old portraits, may yet be found on the heads of judges and barristers. The Beefeaters at the Tower wear the costume of Henry VIIth's body-guard. The University dress of the present year varies but little from that worn soon after the Reformation. The claret-coloured coat, knee-breeches, lace shirt-frills, white silk stockings, and buckled shoes, which once formed the usual attire of a gentleman, still survive as the court-dress. And it need scarcely be said that at *levées* and drawing-rooms, the ceremonies are prescribed with an exactness, and enforced with a rigour, not elsewhere to be found.

Can we consider these two series of coincidences as accidental and unmeaning? Must we not rather conclude that some necessary relationship obtains between them? Are there not such things as a constitutional conservatism, and a constitutional tendency to change? Is there not a class which clings to the old in all things; and another class so in love with progress as often to mistake novelty for improvement? Do we not find some men ready to bow to established authority of whatever kind; while others demand of every such authority its reason, and reject it if it fails to justify itself? And must not the minds thus contrasted tend to become respectively conformist and nonconformist, not only in politics and religion, but in other things? Submission, whether to a government, to the dogmas of ecclesiastics, or to that code of behaviour which society at large has set up, is essentially of the same nature; and the sentiment which induces resistance to the despotism of rulers, civil or spiritual, likewise induces resistance to the despotism of the world's usages. All enactments, alike of the legislature, the consistory, and the saloon—all regulations, formal or virtual, have a common character: they are all limitations of men's freedom. "Do this—Refrain from that," are the blank forms into which they may severally be written; and throughout the understanding is that obedience will bring approbation here and paradise hereafter; while disobedience will entail imprisonment, or sending to Coventry, or eternal torments, as the case may be. And if restraints, however named, and through whatever apparatus of means exercised, are one in their action upon men, it must happen that those who are patient under one kind of restraint, are likely to be patient under another; and conversely, that those impatient of restraint in general, will, on the average, tend to show their impatience in all directions.

That Law, Religion, and Manners are thus related, and that they have in certain contrasted characteristics of men a common support and a common danger, will, however, be most clearly seen on discovering that they have a common origin. Little as from present appearances we should suppose it, we shall yet find that at first, the control of religion, the control of laws, and the control of manners, were all one control. Strange as it now seems, we believe it to be demonstrable that the rules of etiquette, the provisions of the statute-book, and the commands of the decalogue, have grown from the same root,

If we go far enough back into the ages of primeval Fetishism, it becomes manifest that originally Deity, Chief, and Master of the Ceremonies were identical. To make good these positions, and to show their bearing on what is to follow, it will be necessary here to traverse ground that is in part somewhat beaten, and at first sight irrelevant to our topic. We will pass over it as quickly as consists with the exigencies of the argument.

That the earliest social aggregations were ruled solely by the will of the strong man, few dispute.[1] That from the strong man proceeded not only Monarchy, but the conception of a God, few admit: much as Carlyle and others have said in evidence of it. If, however, those who are unable to believe this, will lay aside the ideas of God and man in which they have been educated, and study the aboriginal ideas of them, they will at least see some probability in the hypothesis. Let them remember that before experience had yet taught men to distinguish between the possible and the impossible; and while they were ready on the slightest suggestion to ascribe unknown powers to any object and make a fetish of it; their conceptions of humanity and its capacities were necessarily vague, and without specific limits. The man who by unusual strength, or cunning, achieved something that others had failed to achieve, or something which they did not understand, was considered by them as differing from themselves; and, as we see in the belief of some Polynesians that only their chiefs have souls, or in that of the ancient Peruvians that their nobles were divine by birth, the ascribed difference was apt to be not one of degree only, but one of kind. Let them remember next, how gross were the notions of God, or rather of gods, prevalent during the same era and afterwards—how concretely gods were conceived as men of specific aspects dressed in specific ways—how their names were literally "the strong," "the destroyer," "the powerful one,"—how, according to the Scandinavian mythology, the "sacred duty of blood-revenge" was acted on by the gods themselves,—and how they were not only human in their vindictiveness, their cruelty, and their quarrels with each other, but were supposed to have amours on earth, and to consume the viands placed on their altars. Add to which, that in various mythologies, Greek, Scandinavian, and others, the oldest beings are giants; that according to a traditional genealogy the gods, demigods, and in some cases men, are descended from these after the human fashion; and that while in the East we hear of sons of God who saw the daughters of men that they were fair, the Teutonic myths tell of unions between the sons of men and the daughters of the gods. Let them remember, too, that at first the idea of death differed widely from that which we have; that there are still tribes who, on the decease of one of their number, attempt to make the corpse stand, and put food into its mouth; that the Peruvians had feasts at which the mummies of their dead Incas presided, when, as Prescott says, they paid attention "to these insensible remains as if they were instinct with life;" that among the Fijians it is believed that every enemy has to be killed twice; that the Eastern Pagans give extension and figure to the soul, and attribute to it all the same members, all the same substances, both solid and liquid, of which our bodies are composed; and that it is the custom among most barbarous races to bury food, weapons, and trinkets along with the dead body, under the manifest belief that it will presently need them. Lastly, let them remember that the other world, as originally conceived, is simply some distant part of this world—some Elysian fields, some happy hunting-ground, accessible even to the living, and to

[1] The few who disputed it would be right however. There are stages preceding that in which chiefly power becomes established; and in many cases it never does become established.

which, after death, men travel in anticipation of a life analogous in general character to that which they led before. Then, co-ordinating these general facts —the ascription of unknown powers to chiefs and medicine men; the belief in deities having human forms, passions, and behaviour; the imperfect comprehension of death as distinguished from life; and the proximity of the future abode to the present, both in position and character—let them reflect whether they do not almost unavoidably suggest the conclusion that the aboriginal god is the dead chief: the chief not dead in our sense, but gone away, carrying with him food and weapons to some rumoured region of plenty, some promised land, whither he had long intended to lead his followers, and whence he will presently return to fetch them. This hypothesis once entertained, is seen to harmonize with all primitive ideas and practices. The sons of the deified chief reigning after him, it necessarily happens that all early kings are held descendants of the gods; and the fact that alike in Assyria, Egypt, among the Jews, Phœnicians, and ancient Britons, kings' names were formed out of the names of the gods, is fully explained. The genesis of Polytheism out of Fetishism, by the successive migrations of the race of god-kings to the other world—a genesis illustrated in the Greek mythology, alike by the precise genealogy of the deities, and by the specifically-asserted apotheosis of the later ones—tends further to bear it out. It explains the fact that in the old creeds, as in the still extant creed of the Otaheitans, every family has its guardian spirit, who is supposed to be one of their departed relatives; and that they sacrifice to these as minor gods—a practice still pursued by the Chinese and even by the Russians. It is perfectly congruous with the Grecian myths concerning the wars of the Gods with the Titans and their final usurpation; and it similarly agrees with the fact that among the Teutonic gods proper was one Freir who came among them by adoption, "but was born among the *Vanes*, a somewhat mysterious *other* dynasty of gods, who had been conquered and superseded by the stronger and more warlike Odin dynasty." It harmonizes, too, with the belief that there are different gods to different territories and nations, as there were different chiefs; that these gods contend for supremacy as chiefs do; and it gives meaning to the boast of neighbouring tribes—"Our god is greater than your god." It is confirmed by the notion universally current in early times, that the gods come from this other abode, in which they commonly live, and appear among men—speak to them, help them, punish them. And remembering this, it becomes manifest that the prayers put up by primitive peoples to their gods for aid in battle, are meant literally—that their gods are expected to come back from the other kingdom they are reigning over, and once more fight the old enemies they had before warred against so implacably; and it needs but to name the *Iliad*, to remind every one how thoroughly they believed the expectation fulfilled.[1]

All government, then, being originally that of the strong man who has become a fetish by some manifestation of superiority, there arises, at his death—his supposed departure on a long-

[1] In this paragraph, which I have purposely left standing word for word as it did when republished with other essays in Dec. 1857, will be seen the outline of the ghost-theory. Though there are references to fetishism as a primitive form of belief, and though at that time I had passively accepted the current theory (though never with satisfaction, for the origin of fetishism as then conceived seemed incomprehensible) yet the belief that inanimate objects may possess supernatural powers (which is what was then understood as fetishism) is not dwelt upon as a primitive belief. The one thing which is dwelt upon is the belief in the double of the dead man as continuing to exist, and as becoming an object of propitiation and eventually of worship. There are clearly marked out the rudiments which, when supplied with the mass of facts collected in the *Descriptive Sociology*, developed into the doctrine elaborated in Part I. of *The Principles of Sociology*.

projected expedition, in which he is accompanied by the slaves and concubines sacrificed at his tomb—there arises, then, the incipient division of religious from political control, of spiritual rule from civil. His son becomes deputed chief during his absence; his authority is cited as that by which his son acts; his vengeance is invoked on all who disobey his son; and his commands, as previously known or as asserted by his son, become the germ of a moral code: a fact we shall the more clearly perceive if we remember, that early moral codes inculcate mainly the virtues of the warrior, and the duty of exterminating some neighbouring tribe whose existence is an offence to the deity. From this point onwards, these two kinds of authority, at first complicated together as those of principal and agent, become slowly more and more distinct. As experience accumulates, and ideas of causation grow more precise, kings lose their supernatural attributes; and, instead of God-king, become God-descended king, God-appointed king, the Lord's anointed, the vicegerent of Heaven, ruler reigning by Divine right. The old theory, however, long clings to men in feeling, after it has disappeared in name; and "such divinity doth hedge a king," that even now, many, on first seeing one, feel a secret surprise at finding him an ordinary sample of humanity. The sacredness attaching to royalty attaches afterwards to its appended institutions—to legislatures, to laws. Legal and illegal are synonymous with right and wrong; the authority of Parliament is held unlimited; and a lingering faith in governmental power continually generates unfounded hopes from its enactments. Political scepticism, however, having destroyed the divine *prestige* of royalty, goes on ever-increasing, and promises ultimately to reduce the State to a purely secular institution, whose regulations are limited in their sphere, and have no other authority than the general will. Meanwhile, the religious control has been little by little separating itself from the civil, both in its essence and in its forms. While from the God-king of the barbarian have arisen in one direction secular rulers who, age by age, have been losing the sacred attributes men ascribed to them; there has arisen in another direction, the conception of a deity, who, at first human in all things, has been gradually losing human materiality, human form, human passions, human modes of action: until now, anthropomorphism has become a reproach. Along with this wide divergence in men's ideas of the divine and civil ruler has been taking place a corresponding divergence in the codes of conduct respectively proceeding from them. While the king was a deputy-god—a governor such as the Jews looked for in the Messiah—a governor considered, as the Czar still is, "our God upon earth,"—it, of course, followed that his commands were the supreme rules. But as men ceased to believe in his supernatural origin and nature, his commands ceased to be the highest; and there arose a distinction between the regulations made by him, and the regulations handed down from the old god-kings, who were rendered ever more sacred by time and the accumulation of myths. Hence came respectively, Law and Morality: the one growing ever more concrete, the other more abstract; the authority of the one ever on the decrease, that of the other ever on the increase; originally the same, but now placed daily in more marked antagonism. Simultaneously there has been going on a separation of the institutions administering these two codes of conduct. While they were yet one, of course Church and State were one: the king was arch-priest, not nominally, but really—alike the giver of new commands and the chief interpreter of the old commands; and the deputy-priests coming out of his family were thus simply expounders of the dictates of their ancestry: at first as recollected, and afterwards as ascertained by professed

interviews with them. This union between sacred and secular—which still existed practically during the middle ages, when the authority of kings was mixed up with the authority of the pope, when there were bishop-rulers having all the powers of feudal lords, and when priests punished by penances—has been, step by step, becoming less close. Though monarchs are still "defenders of the faith," and ecclesiastical chiefs, they are but nominally such. Though bishops still have civil power, it is not what they once had. Protestantism shook loose the bonds of union; Dissent has long been busy in organizing a mechanism for religious control, wholly independent of law; in America, a separate organization for that purpose already exists; and if anything is to be hoped from the Anti-State-Church Association—or, as it has been newly named, "The Society for the Liberation of Religion from State Patronage and Control"—we shall presently have a separate organization here also. Thus, in authority, in essence, and in form, political and spiritual rule have been ever more widely diverging from the same root. That increasing division of labour which marks the progress of society in other things, marks it also in this separation of government into civil and religious; and if we observe how the morality which now forms the substance of religions in general, is beginning to be purified from the associated creeds, we may anticipate that this division will be ultimately carried much further.

Passing now to the third species of control—that of Manners—we shall find that this, too, while it had a common genesis with the others, has gradually come to have a distinct sphere and a special embodiment. Among early aggregations of men before yet social observances existed, the sole forms of courtesy known were the signs of submission to the strong man; as the sole law was his will, and the sole religion the awe of his supposed supernaturalness. Originally, ceremonies were modes of behaviour to the god-king. Our commonest titles have been derived from his names. And all salutations were primarily worship paid to him. Let us trace out these truths in detail, beginning with titles.

The fact already noticed, that the names of early kings among divers races are formed by the addition of certain syllables to the names of their gods—which certain syllables, like our *Mac* and *Fitz*, probably mean "son of," or "descended from"—at once gives meaning to the term *Father* as a divine title. And when we read, in Selden, that "the composition out of these names of Deities was not only proper to Kings: their Grandes and more honorable subjects" (no doubt members of the royal race) "had sometimes the like"; we see how the term *Father*, properly used by these also, and by their multiplying descendants, came to be a title used by the people in general. As bearing on this point, it is significant that in the least advanced country of Europe, where belief in the divine nature of the ruler still lingers, *Father* in this higher sense, is still a regal distinction. When, again, we remember how the divinity at first ascribed to kings was not a complimentary fiction but a supposed fact; and how, further, the celestial bodies were believed to be personages who once lived among men; we see that the appellations of oriental rulers, "Brother to the Sun," &c., were probably once expressive of a genuine belief; and have simply, like many other things, continued in use after all meaning has gone out of them. We may infer, too, that the titles God, Lord, Divinity, were given to primitive rulers literally—that the *nostra divinitas* applied to the Roman emperors, and the various sacred designations that have been borne by monarchs, down to the still extant phrase, "Our Lord the King," are the dead and dying forms of what were once living facts. From these names, God, Father, Lord, Divinity, originally belonging to the God-king,

and afterwards to God and the king, the derivation of our commonest titles of respect is traceable. There is reason to think that these titles were originally proper names. Not only do we see among the Egyptians, where Pharaoh was synonymous with king, and among the Romans, where to be Cæsar meant to be Emperor, that the proper names of the greatest men were transferred to their successors, and so became class-names; but in the Scandinavian mythology we may trace a human title of honour up to the proper name of a divine personage. In Anglo-Saxon *bealdor*, or *baldor*, means *Lord;* and Balder is the name of the favourite of Odin's sons. How these names of honour became general is easily understood. The relatives of the primitive kings—the grandees described by Selden as having names formed on those of the gods, and shown by this to be members of the divine race—necessarily shared in the epithets descriptive of superhuman relationships and nature. Their ever-multiplying offspring inheriting these, gradually rendered them comparatively common. And then they came to be applied to every man of power: partly from the fact that, in those early days when men conceived divinity simply as a stronger kind of humanity, great persons could be called by divine epithets with but little exaggeration; partly from the fact that the unusually potent were apt to be considered as unrecognised or illegitimate descendants of "the strong, the destroyer, the powerful one": and partly, also, from compliment and the desire to propitiate. As superstition diminished, this last became the sole cause. And if we remember that it is the nature of compliment, to attribute more than is due—that in the ever widening application of "esquire," in the perpetual repetition of "your honour" by the fawning Irishman, and in the use of the name "gentleman" to any coal-heaver or dustman by the lower classes of London, we have current examples of the depreciation of titles consequent on compliment—and that in barbarous times, when the wish to propitiate was stronger than now, this effect must have been greater; we shall see that there naturally arose from this cause an extensive misuse of all early distinctions. Hence the facts that the Jews called Herod a god; that *Father*, in its higher sense, was a term used among them by servants to masters; that *Lord* was applicable to any person of worth and power. Hence, too, the fact that, in the later periods of the Roman Empire, every man saluted his neighbour as *Dominus* or *Rex*. But it is in the titles of the middle ages, and in the growth of our modern ones out of them, that the process is most clearly seen. *Herr*, *Don*, *Signor*, *Seigneur*, *Señor*, were all originally descriptive names of rulers. By the complimentary use of these names to all who could, on any pretence, be supposed to merit them, and by successive descents to still lower grades, they have come to be common forms of address. At first the phrase in which a serf accosted his despotic chief, *mein Herr* is now familiarly applied in Germany to ordinary people. The Spanish title *Don*, once proper to noblemen and gentlemen only, is now accorded to all classes. So, too, it is with *Signor* in Italy. *Seigneur* and *Monseigneur*, by contraction in *Sieur* and *Monsieur*, have produced the term of respect claimed by every Frenchman. And whether *Sire* be or be not a like contraction of *Signor*, it is clear that, as it was borne by sundry of the ancient feudal lords of France, who, as Selden says, "affected rather to bee stiled by the name of *Sire* than Baron, as *Le Sire de Montmorencie*, *Le Sire de Beaujeu*, and the like," and as it has been commonly used to monarchs, our word *Sir*, which is derived from it, originally meant lord or king. Thus, too, it is with feminine titles. *Lady*, which, according to Horne Tooke, means *exalted*, and was at first given only to the few, is now given to all women of education. *Dame*, once an honourable name to which, in

old books, we find the epithets of "high-born" and "stately" affixed, has now, by repeated widenings of its application, become relatively a term of contempt. And if we trace the compound of this, *ma Dame*, through its contractions—*Madam*, *ma'am*, *mam*, *mum*, we find that the "Yes'm" of Sally to her mistress is originally equivalent to "Yes, my exalted," or "Yes, your highness." Throughout, therefore, the genesis of words of honour has been the same. Just as with the Jews and with the Romans, has it been with the modern Europeans. Tracing these everyday names to their primitive significations of *lord* and *king*, and remembering that in aboriginal societies these were applied only to the gods and their descendants, we arrive at the conclusion that our familiar *Sir* and *Monsieur* are, in their primary and expanded meanings, terms of adoration.

Further to illustrate this gradual depreciation of titles, and to confirm the inference drawn, it may be well to notice in passing, that the oldest of them have, as might be expected, been depreciated to the greatest extent. Thus, *Master*—a word proved by its derivation, and by the similarity of the connate words in other languages (Fr., *maître* for *maistre*; Dutch, *meester*; Dan., *mester*; Ger., *meister*) to have been one of the earliest in use for expressing lordship—has now become applicable to children only, and, under the modification of "Mister," to persons next above the labourer. Again, knighthood, the oldest kind of dignity, is also the lowest; and Knight Bachelor, which is the lowest order of knighthood, is more ancient than any other of the orders. Similarly, too, with the peerage: Baron is alike the earliest and least elevated of its divisions. This continual degradation of all names of honour has, from time to time, made it requisite to introduce new ones having the distinguishing effects which the originals had lost by generality of use; just as our habit of misapplying superlatives has, by gradually destroying their force, entailed the need for fresh ones. And if, within the last thousand years, this process has worked results thus marked, we may readily conceive how, during previous thousands, the titles of gods and demigods came to be used to all persons exercising power; as they have since come to be used to persons of respectability.

If from names of honour we turn to phrases of honour, we find similar facts. The oriental styles of address, applied to ordinary people—"I am your slave," "All I have is yours," "I am your sacrifice"—attribute to the individual spoken to the same greatness that *Monsieur* and *My Lord* do: they ascribe to him the character of an all-powerful ruler, so immeasurably superior to the speaker as to be his owner. So, likewise, with the Polish expressions of respect—"I throw myself under your feet," "I kiss your feet." In our now meaningless subscription to a formal letter—"Your most obedient servant"—the same thing is visible. Nay, even in the familiar signature "Yours faithfully," the "yours," if interpreted as originally meant, is the expression of a slave to his master. All these dead forms were once living embodiments of fact; were primarily the genuine indications of that submission to authority which they verbally assert; were afterwards naturally used by the weak and cowardly to propitiate those above them; gradually grew to be considered the due of such; and, by a continually wider misuse, have lost their meanings, as *Sir* and *Master* have done. That, like titles, they were in the beginning used only to the God-king, is indicated by the fact that, like titles, they were subsequently used in common to God and the king. Religious worship has ever largely consisted of professions of obedience, of being God's servants, of belonging to him to do what he will with. Like titles, therefore, these common phrases of honour had a devotional origin. Perhaps, however, it is in the use of the word *you* as a singular pronoun

that the popularizing of what were once supreme distinctions is most markedly illustrated. This addressing of a single individual in the plural, was originally an honour given only to the highest—was the reciprocal of the imperial "we" assumed by such. Yet now, by being applied to successively lower and lower classes, it has become all but universal. Only by one sect of Christians, and in a few secluded districts, is the primitive *thou* still used. And the *you*, in becoming common to all ranks, has simultaneously lost every vestige of the distinction once attaching to it.

But the genesis of Manners out of forms of allegiance and worship, is above all shown in modes of salutation. Note first the significance of the word. Among the Romans, the *salutatio* was a daily homage paid by clients and inferiors to their superiors. This was alike the case with civilians and in the army. The very derivation of our word, therefore, is suggestive of submission. Passing to particular forms of obeisance (mark the word again), let us begin with the Eastern one of baring the feet. This was, primarily, a mark of reverence, alike to a god and a king. The act of Moses before the burning bush, and the practice of Mahometans, who are sworn on the Koran with their shoes off, exemplify the one employment of it; the custom of the Persians, who remove their shoes on entering the presence of their monarch, exemplifies the other. As usual, however, this homage, paid next to inferior rulers, has descended from grade to grade. In India it is a common mark of respect; the lower orders of Turks never enter the presence of their superiors but in their stockings; and in Japan, this baring of the feet is an ordinary salutation of man to man. Take another case. Selden, describing the ceremonies of the Romans, says:—"For whereas it was usuall either to kiss the Images of their Gods, or, adoring them, to stand somewhat off before them, solemnly moving the right hand to the lips, and then, casting it as if they had cast kisses, to turne the body on the same hand (which was the right forme of Adoration), it grew also by custom, first that the Emperors, being next to Deities, and by some accounted as Deities, had the like done to them in acknowledgment of their Greatness." If, now, we call to mind the awkward salute of a village school-boy, made by putting his open hand up to his face and describing a semicircle with his forearm; and if we remember that the salute thus used as a form of reverence in country districts, is most likely a remnant of the feudal times; we shall see reason for thinking that our common wave of the hand to a friend across the street, represents what was primarily a devotional act.

Similarly have originated all forms of respect depending upon inclinations of the body. Entire prostration is the aboriginal sign of submission. The passage of Scripture—"Thou hast put all under his feet," and that other one, so suggestive in its anthropomorphism—"The Lord said unto my Lord, sit thou at my right hand, until I make thine enemies thy footstool," imply, what the Assyrian sculptures bear out, that it was the practice of the ancient god-kings of the East to trample on the conquered. As there are existing savages who signify submission by placing the neck under the foot of the person submitted to, it becomes obvious that all prostration, especially when accompanied by kissing the foot, expressed a willingness to be trodden upon—was an attempt to mitigate wrath by saying, in signs, "Tread on me if you will." Remembering, too, that kissing the foot, as of the Pope and of a saint's statue, still continues in Europe to be a mark of extreme reverence; that prostration to feudal lords was once general, and that its disappearance must have taken place, not abruptly, but by gradual change into something else; we have ground for deriving from these deepest of humiliations all inclinations of respect: especially as the transition is traceable. The reverence of a

Russian serf, who bends his head to the ground, and the salaam of the Hindoo, are abridged prostrations; a bow is a short salaam; a nod is a short bow. Should any hesitate to admit this conclusion, then perhaps, on being reminded that the lowest of these obeisances are common where the submission is most abject; that among ourselves the profundity of the bow marks the amount of respect; and lastly, that the bow is even now used devotionally in our churches —by Catholics to their altars, and by Protestants at the name of Christ—they will see sufficient reason for thinking that this salutation also was originally worship.

The same may be said, too, of the curtsy, or courtesy, as it is otherwise written. Its derivation from *courtoisie*, courteousness, that is, behaviour like that at court, at once shows that it was primarily the reverence paid to a monarch. And if we call to mind that falling on the knees, or on one knee, has been a common obeisance of subjects to rulers; that in ancient manuscripts and tapestries, servants are depicted as assuming this attitude while offering the dishes to their masters at table; and that this same attitude is assumed towards our own queen at every presentation; we may infer, what the character of the curtsy itself suggests, that it is an abridged act of kneeling. As the word has been contracted from *courtoisie* into curtsy; so the motion has been contracted from a placing of the knee on the floor, to a lowering of the knee towards the floor. Moreover, when we compare the curtsy of a lady with the awkward one a peasant girl makes, which, if continued, would bring her down on both knees, we may see in this last a remnant of that greater reverence required of serfs. And when, from considering that simple kneeling of the West, still represented by the curtsy, we pass Eastward, and note the attitude of the Mahommedan worshipper, who not only kneels but bows his head to the ground, we may infer that the curtsy also is an evanescent form of the aboriginal prostration. In further evidence of this it may be remarked, that there has but recently disappeared from the salutations of men, an action having the same proximate derivation with the curtsy. That backward sweep of the right foot with which the conventional stage-sailor accompanies his bow—a movement which prevailed generally in past generations, when "a bow and a scrape" went together, and which, within the memory of living persons, was made by boys to their master when entering school, with the effect of wearing a hole in the floor—is pretty clearly a preliminary to going on one knee. A motion so ungainly could never have been intentionally introduced; even if the artificial introduction of obeisances were possible. Hence we must regard it as the remnant of something antecedent: and that this something antecedent was humiliating may be inferred from the phrase, "scraping an acquaintance"; which, being used to denote the gaining of favour by obsequiousness, implies that the scrape was considered a mark of servility—that is, of servile position.

Consider, again, the uncovering of the head. Almost everywhere this has been a sign of reverence, alike in temples and before potentates; and it yet preserves among us some of its original meaning. Whether it rains, hails, or shines, you must keep your head bare while speaking to the monarch; and no one may keep his hat on in a place of worship. As usual, however, this ceremony, at first a submission to gods and kings, has become in process of time a common civility. Once an acknowledgment of another's unlimited supremacy, the removal of the hat is now a salute accorded to very ordinary persons; and that uncovering originally reserved for entrance into "the house of God" or the residence of the ruler, good manners now dictates on entrance into a labourer's cottage.

Standing, too, as a mark of respect,

has undergone like extensions in its application. Shown, by the practice in our churches, to be intermediate between the humiliation signified by kneeling and the self-respect which sitting implies, and used at courts as a form of homage when more active demonstrations of it have been made, this posture is now employed in daily life to show consideration; as seen alike in the attitude of a servant before a master, and in that rising which politeness prescribes on the entrance of a visitor.

Many other threads of evidence might have been woven into our argument. As, for example, the significant fact, that if we trace back our still existing law of primogeniture—if we consider it as displayed by Scottish clans, in which not only ownership but government devolved from the beginning on the eldest son of the eldest—if we look further back, and observe that the old titles of lordship, *Signor*, *Seigneur*, *Señor*, *Sire*, *Sieur*, all originally mean senior, or elder—if we go Eastward, and find that *Sheick* has a like derivation, and that the Oriental names for priests, as *Pir*, for instance, are literally interpreted *old man*—if we note in Hebrew records how far back dates the ascribed superiority of the first-born, how great the authority of elders, and how sacred the memory of patriarchs—and if, then, we remember that among divine titles are "Ancient of Days," and "Father of Gods and men;" —we see how completely these facts harmonize with the hypothesis, that the aboriginal god is the first man sufficiently great to become a tradition, the earliest whose power and deeds made him remembered; that hence antiquity unavoidably became associated with superiority, and age with nearness in blood to "the powerful one"; that so there naturally arose that domination of the eldest which characterizes the history of all the higher races, and that theory of human degeneracy which even yet survives. We might further dwell on the facts, that *Lord* signifies high-born, or, as the same root gives a word meaning heaven, possibly heaven-born; that, before it became common, *Sir* or *Sire*, as well as *Father*, was the distinction of a priest; that *worship*, originally worth-ship—a term of respect that has been used commonly, as well as to magistrates—is also our term for the act of attributing greatness or worth to the Deity; so that to ascribe worth-ship to a man is to worship him. We might make much of the evidence that all early governments are more or less distinctly theocratic; and that among ancient Eastern nations even the commonest forms and customs had religious sanctions. We might enforce our argument respecting the derivation of ceremonies, by tracing out the aboriginal obeisance made by putting dust on the head, which symbolizes putting the head in the dust; by affiliating the practice found in certain tribes, of doing another honour by presenting him with a portion of hair torn from the head—an act which seems tantamount to saying, "I am your slave"; by investigating the Oriental custom of giving to a visitor any object he speaks of admiringly, which is pretty clearly a carrying out of the compliment, "All I have is yours."

Without enlarging, however, on these and minor facts, we venture to think that the evidence assigned is sufficient. Had the proofs been few, or of one kind, little faith could have been placed in the inference. But numerous as they are, alike in the case of titles, in that of complimentary phrases, and in that of salutes—similar and simultaneous, too, as the process of depreciation has been in all of these; the evidences become strong by mutual confirmation. And when we recollect, also, that not only have the results of this process been visible in various nations and in all times, but that they are occurring among ourselves at the present moment, and that the causes assigned for previous depreciations may be seen daily working out others—when we recollect this, it becomes scarcely possible to doubt that

the process has been as alleged; and that our ordinary words, acts, and phrases of civility originally expressed submission to another's omnipotence.

Thus the general doctrine, that all kinds of government exercised over men were at first one government—that the political, the religious, and the ceremonial forms of control are divergent branches of a general and once indivisible control—begins to look tenable. When, with the above facts fresh in mind, we read that in Eastern traditions Nimrod, among others, figures in all the characters of hero, king, and divinity—when we turn to the sculptures exhumed by Mr. Layard, and contemplating in them the effigies of kings driving over enemies, and adored by prostrate slaves, then observe how their actions correspond to the primitive names for gods, "the strong," "the destroyer," "the powerful one"—and when, lastly, we discover that among races of men still living, there are current superstitions analogous to those which old records and old buildings indicate; we begin to realize the probability of the hypothesis that has been set forth. Representing to ourselves the conquering chief as figured in ancient myths, and poems, and ruins; we may see that all rules of conduct spring from his will. Alike legislator and judge, quarrels among his subjects are decided by him; and his words become the Law. Awe of him is the incipient Religion; and his maxims furnish his first precepts. Submission is made to him in the forms he prescribes; and these give birth to Manners. From the first, time developes political allegiance and the administration of justice; from the second, the worship of a being whose personality becomes ever more vague, and the inculcation of precepts ever more abstract; from the third, forms and names of honour and the rules of etiquette. In conformity with the law of evolution of all organized bodies, that general functions are gradually separated into the special functions constituting them, there have grown up in the social organism for the better performance of the governmental office, an apparatus of law-courts, judges, and barristers; a national church, with its bishops and priests; and a system of caste, titles, and ceremonies, administered by society at large. By the first, overt aggressions are cognized and punished; by the second, the disposition to commit such aggressions is in some degree checked; by the third, those minor breaches of good conduct which the others do not notice, are denounced and chastised. Law and Religion control behaviour in its essentials; Manners control it in its details. For regulating those daily actions which are too numerous and too unimportant to be officially directed there comes into play this subtler set of restraints. And when we consider what these restraints are—when we analyze the words, and phrases, and movements employed, we see that in origin as in effect, the system is a setting up of temporary governments between all men who come in contact, for the purpose of better managing the intercourse between them.

From the proposition, that these several kinds of government are essentially one, both in genesis and function, may be deduced several important corollaries, directly bearing on our special topic.

Let us first notice, that there is not only a common origin and office for all forms of rule, but a common necessity for them. The aboriginal man, coming fresh from the killing of bears and from lying in ambush for his enemy, has, by the necessities of his condition, a nature requiring to be curbed in its every impulse. Alike in war and in the chase, his daily discipline has been that of sacrificing other creatures to his own needs and passions. His character, bequeathed to him by ancestors who led similar lives, is moulded by this discipline—is fitted to this existence. The unlimited selfishness, the love of inflicting pain, the bloodthirstiness, thus kept active, he brings with him into the social

state. These dispositions put him in constant danger of conflict with his equally savage neighbour. In small things as in great, in words as in deeds, he is aggressive; and is hourly liable to the aggressions of others like natured. Only, therefore, by rigorous control exercised over all actions, can the primitive unions of men be maintained. There must be a ruler strong, remorseless, and of indomitable will; there must be a creed terrible in its threats to the disobedient; there must be servile submission of inferiors to superiors. The law must be cruel; the religion must be stern; the ceremonies must be strict. The co-ordinate necessity for these several kinds of restraint might be largely illustrated from history were there space. Suffice it to point out that where the civil power has been weak, the multiplication of thieves, assassins, and banditti, has indicated the approach of social dissolution; that when, from the corruptness of its ministry, religion has lost its influence, as it did just before the Flagellants appeared, the State has been endangered; and that the disregard of established social observances has ever been an accompaniment of political revolutions. Whoever doubts the necessity for a government of manners proportionate in strength to the co-existing political and religious governments, will be convinced on calling to mind that until recently even elaborate codes of behaviour failed to keep gentlemen from quarrelling in the streets and fighting duels in taverns; and on remembering that even now people exhibit at the doors of a theatre, where there is no ceremonial law to rule them, an aggressiveness which would produce confusion if carried into social intercourse.

As might be expected, we find that, having a common origin and like general functions, these several controlling agencies act during each era with similar degrees of vigour. Under the Chinese despotism, stringent and multitudinous in its edicts and harsh in the enforcement of them, and associated with which there is an equally stern domestic despotism exercised by the eldest surviving male of the family, there exists a system of observances alike complicated and rigid. There is a tribunal of ceremonies. Previous to presentation at court, ambassadors pass many days in practising the required forms. Social intercourse is cumbered by endless compliments and obeisances. Class distinctions are strongly marked by badges. And if there wants a definite measure of the respect paid to social ordinances, we have it in the torture to which ladies submit in having their feet crushed. In India, and indeed throughout the East, there exists a like connexion between the pitiless tyranny of rulers, the dread terrors of immemorial creeds, and the rigid restraint of unchangeable customs. Caste regulations continue still unalterable; the fashions of clothes and furniture have remained the same for ages; suttees are so ancient as to be mentioned by Strabo and Diodorus Siculus; justice is still administered at the palace-gates as of old; in short, "every usage is a precept of religion and a maxim of jurisprudence." A similar relationship of phenomena was exhibited in Europe during the Middle Ages. While its governments, general and local, were despotic, while the Church was unshorn of its power, while the criminal code was full of horrors and the hell of the popular creed full of terrors, the rules of behaviour were both more numerous and more carefully conformed to than now. Differences of dress marked divisions of rank. Men were limited by law to certain widths of shoe-toes; and no one below a specified degree might wear a cloak less than so many inches long. The symbols on banners and shields were carefully attended to. Heraldry was an important branch of knowledge. Precedence was strictly insisted on. And those various salutes of which we now use the abridgments, were gone through in full. Even during

our own last century, with its corrupt House of Commons and little-curbed monarchs, we may mark a correspondence of social formalities. Gentlemen were still distinguished from lower classes by dress; and children addressed their parents as *Sir* and *Madam*.

A further corollary naturally following this last, and almost, indeed, forming part of it, is, that these several kinds of government decrease in stringency at the same rate. Simultaneously with the decline in the influence of priesthoods, and in the fear of eternal torments—simultaneously with the mitigation of political tyranny, the growth of popular power, and the amelioration of criminal codes; has taken place that diminution of formalities and that fading of distinctive marks, now so observable. Looking at home, we may note that there is less attention to precedence than there used to be. No one in our day ends an interview with the phrase "your humble servant." The employment of the word *Sir*, once general in social intercourse, is at present considered bad breeding; and on the occasions calling for them, it is held vulgar to use the words "Your Majesty," or "Your Royal Highness," more than once in a conversation. People no longer formally drink one another's healths; and even the taking wine with one another at dinner has ceased to be fashionable. It is remarked of us by foreigners, that we take off our hats less than any other nation in Europe—a remark which should be coupled with the other, that we are the freest nation in Europe. As already implied, this association of facts is not accidental. These modes of address and titles and obeisances, bearing about them, as they all do, something of that servility which marks their origin, become distasteful in proportion as men become more independent themselves, and sympathize more with the independence of others. The feeling which makes the modern gentleman tell the labourer, standing bareheaded before him, to put on his hat—the feeling which gives us a dislike to those who cringe and fawn—the feeling which makes us alike assert our own dignity and respect that of others—the feeling which thus leads us more and more to discountenance forms and names which confess inferiority and submission; is the same feeling which resists despotic power and inaugurates popular government, denies the authority of the Church, and establishes the right of private judgment.

A fourth fact, akin to the foregoing, is, that with decreasing coerciveness in these several kinds of government, their respective forms lose their meanings. The same process which has made our monarch put forth as his own acts what are the acts of ministers approved by the people, and has thus changed him from master into agent—the same process which, making attendance at church very much a matter of respectability, has done away with the telling of beads, the calling on saints, and the performance of penances; is a process by which titles and ceremonies that once had a meaning and a power have been reduced to empty forms. Coats of arms which served to distinguish men in battle, now figure on the carriage panels of retired merchants. Once a badge of high military rank, the shoulder-knot has become, on the modern footman, a mark of servitude. The name Banneret, which originally marked a partially-created Baron—a Baron who had passed his military "little go"—is now, under the modification of Baronet, applicable to any one favoured by wealth or interest or party feeling. Knighthood has so far ceased to be an honour, that men honour themselves by declining it. The military dignity *Escuyer* has, in the modern Esquire, become a wholly unmilitary affix.

But perhaps it is in that class of social observances comprehended under the term Fashion (which we must here discuss parenthetically) that this process is seen with the greatest distinctness. As contrasted with Manners, which dictate our minor acts in relation to

other persons, Fashion dictates our minor acts in relation to ourselves. While the one prescribes that part of our deportment which directly affects our neighbours; the other prescribes that part of our deportment which is primarily personal, and in which our neighbours are concerned only as spectators. Thus distinguished as they are, however, the two have a common source. For while, as we have shown, Manners originate by imitation of the behaviour pursued *towards* the great; Fashion originates by imitation of the behaviour *of* the great. While the one has its derivation in the titles, phrases, and salutes used *to* those in power; the other is derived from the habits and appearances exhibited *by* those in power. The Carib mother who squeezes her child's head into a shape like that of the chief; the young savage who makes marks on himself similar to the scars carried by the warriors of his tribe; the Highlander who adopts the plaid worn by the head of his clan; the courtiers who affect greyness, or limp, or cover their necks, in imitation of their king, and the people who ape the courtiers; are alike acting under a kind of government connate with that of Manners, and, like it too, primarily beneficial. For notwithstanding the numberless absurdities into which this copying has led people, from nose-rings to ear-rings, from painted faces to beauty spots, from shaven heads to powdered wigs, from filed teeth and stained nails to bell-girdles, peaked shoes, and breeches stuffed with bran, it must yet be concluded that as the men of will, intelligence, and originality, who have got to the top, are, on the average, more likely to show judgment in their habits and tastes than the mass, the imitation of such is advantageous. By and by, however, Fashion, decaying like these other forms of rule, almost wholly ceases to be an imitation of the best, and becomes an imitation of quite other than the best. As those who take orders are not those having a special fitness for the priestly office, but those who hope to get livings; as legislators and public functionaries do not become such by virtue of their political insight and power to rule, but by virtue of birth, acreage, and class influence; so, the self-elected clique who set the fashion, do this, not by force of nature, by intellect, by higher worth, or better taste, but solely by unchecked assumption. Among the initiated are to be found neither the noblest in rank, the chief in power, the best cultured, the most refined, nor those of greatest genius, wit, or beauty; and their reunions, so far from being superior to others, are noted for their inanity. Yet, by the example of these sham great, and not by that of the truly great, does society at large now regulate its habits, its dress, its small usages. As a natural consequence, these have generally little of that suitableness which the theory of fashion implies they should have. Instead of a progress towards greater elegance and convenience, which might be expected to occur did people copy the ways of the really best, or follow their own ideas of propriety, we have a reign of mere whim, of unreason, of change for the sake of change, of wanton oscillations from either extreme to the other. And so life *à la mode*, instead of being life conducted in the most rational manner, is life regulated by spendthrifts and idlers, milliners and tailors, dandies and silly women.

To these several corollaries—that the various orders of control exercised over men have a common origin and a common function, are called out by co-ordinate necessities and co-exist in like stringency, decline together and decay together—it now only remains to add that they simultaneously become less needful. The social discipline which has already wrought out great changes in men, must go on eventually to work out greater ones. That daily curbing of the lower nature and culture of the higher, which out of cannibals and devil-worshippers has evolved philanthropists, lovers of peace, and haters of

superstition, may be expected to evolve out of these, men as much superior to them as they are to their progenitors. The causes that have produced past modifications are still in action; must continue in action as long as there exists any incongruity between men's desires and the requirements of the social state; and must eventually make them organically fit for the social state. As it is now needless to forbid man-eating, so will it ultimately become needless to forbid murder, theft, and the minor offences of our criminal code. Along with growth of human nature into harmony with the moral law, there will go decreasing need for judges and statute-books; when the right course has become the course spontaneously chosen, prospects of future reward or punishment will not be wanted as incentives; and when due regard for others has become instinctive, there will need no code of ceremonies to say how behaviour shall be regulated.

Thus, then, may be recognized the meaning of those eccentricities of reformers which we set out by describing. They are not accidental; they are not mere personal caprices. They are inevitable results of the law of relationship above illustrated. That community of genesis, function, and decay which all forms of restraint exhibit, is simply the obverse of the fact at first pointed out, that they have in two sentiments of human nature a common preserver and a common destroyer. Awe of power originates and cherishes them all; love of freedom undermines and weakens them all. The one defends despotism and asserts the supremacy of laws, adheres to old creeds and supports ecclesiastical authority, pays respect to titles and conserves forms; the other, putting rectitude above legality, achieves periodical instalments of political liberty, inaugurates Protestantism and works out its consequences, ignores the senseless dictates of Fashion and emancipates men from dead customs. To the true reformer no institution is sacred, no belief above criticism. Everything shall conform itself to equity and reason; nothing shall be saved by its prestige. Conceding to each man liberty to pursue his own ends and satisfy his own tastes, he demands for himself like liberty; and consents to no restrictions on this, save those which other men's equal claims involve. No matter whether it be an ordinance of one man, or an ordinance of all men, if it trenches on his legitimate sphere of action, he denies its validity. The tyranny that would impose on him a particular style of dress and a set mode of behaviour, he resists equally with the tyranny that would limit his buyings and sellings, or dictate his creed. Whether the regulation be formally made by a legislature, or informally made by society at large—whether the penalty for disobedience be imprisonment, or frowns and social ostracism, he sees to be a question of no moment. He will utter his belief notwithstanding the threatened punishment; he will break conventions spite of the petty persecutions that will be visited on him. Show him that his actions are inimical to his fellow-men, and he will pause. Prove that he is disregarding their legitimate claims, and he will alter his course. But until you do this—until you demonstrate that his proceedings are essentially inconvenient or inelegant, essentially irrational, unjust, or ungenerous, he will persevere.

Some, indeed, argue that his conduct *is* unjust and ungenerous. They say that he has no right to annoy other people by his whims; that the gentleman to whom his letter comes with no "Esq." appended to the address, and the lady whose evening party he enters with gloveless hands, are vexed at what they consider his want of respect or want of breeding; that thus his eccentricities cannot be indulged save at the expense of his neighbours' feelings; and that hence his nonconformity is in plain terms selfishness.

He answers that this position, if logi-

cally developed, would deprive men of all liberty whatever. Each must conform all his acts to the public taste, and not his own. The public taste on every point having been once ascertained, men's habits must thenceforth remain for ever fixed; seeing that no man can adopt other habits without sinning against the public taste, and giving people disagreeable feelings. Consequently, be it an era of pig-tails or high-heeled shoes, of starched ruffs or trunk-hose, all must continue to wear pig-tails, high-heeled shoes, starched ruffs, or trunk-hose to the crack of doom.

If it be still urged that he is not justified in breaking through others' forms that he may establish his own, and so sacrificing the wishes of many to the wishes of one, he replies that all religious and political changes might be negatived on like grounds. He asks whether Luther's sayings and doings were not extremely offensive to the mass of his cotemporaries; whether the resistance of Hampden was not disgusting to the time-servers around him; whether every reformer has not shocked men's prejudices and given immense displeasure by the opinions he uttered. The affirmative answer he follows up by demanding what right the reformer has, then, to utter these opinions—whether he is not sacrificing the feelings of many to the feelings of one; and so he proves that, to be consistent, his antagonists must condemn not only all nonconformity in actions, but all nonconformity in beliefs.

His antagonists rejoin that *his* position, too, may be pushed to an absurdity. They argue that if a man may offend by the disregard of some forms, he may as legitimately do so by the disregard of all; and they inquire—Why should he not go out to dinner in a dirty shirt, and with an unshorn chin? Why should he not spit on the drawing-room carpet, and stretch his heels up to the mantle-shelf?

The convention-breaker answers, that to ask this, implies a confounding of two widely-different classes of actions—the actions which are *essentially* displeasurable to those around, with the actions which are but *incidentally* displeasurable to them. He whose skin is so unclean as to offend the nostrils of his neighbours, or he who talks so loudly as to disturb a whole room, may be justly complained of, and rightly excluded by society from its assemblies. But he who presents himself in a surtout in place of a dress-coat, or in brown trousers instead of black, gives offence not to men's senses, or their innate tastes, but merely to their bigotry of convention. It cannot be said that his costume is less elegant or less intrinsically appropriate than the one prescribed; seeing that a few hours earlier in the day it is admired. It is the implied rebellion, therefore, which annoys. How little the cause of quarrel has to do with the dress itself, is seen in the fact that a century ago black clothes would have been thought preposterous for hours of recreation, and that a few years hence some now forbidden style may be nearer the requirements of Fashion than the present one. Thus the reformer explains that it is not against the natural restraints, but against the artificial ones, that he protests; and that manifestly the fire of angry glances which he has to bear, is poured upon him because he will not bow down to the idol which society has set up.

Should he be asked how we are to distinguish between conduct which is in itself disagreeable to others, and conduct which is disagreeable by its implication, he answers, that they will distinguish themselves, if men will let them. Actions intrinsically repugnant will ever be frowned upon, and must ever remain as exceptional as now. Actions not intrinsically repugnant will establish themselves as proper. No relaxation of customs will introduce the practice of going to a party in muddy boots, and with unwashed hands; for the dislike of dirt would continue were Fashion abolished to-morrow. That love of approbation

which now makes people solicitous to be *en règle* would still exist—would still make them careful of their personal appearance—would still induce them to seek admiration by making themselves ornamental—would still cause them to respect the natural laws of good behaviour, as they now do the artificial laws. The change would simply be from a repulsive monotony to a picturesque variety. And if there be any regulations respecting which it is uncertain whether they are based on reality or on convention, experiment will soon decide, if due scope be allowed.

When at length the controversy comes round, as controversies often do, to the point whence it started, and the "party of order" repeat their charge against the rebel, that he is sacrificing the feelings of others to gratify his own wilfulness, he replies once for all that they cheat themselves by mis-statements. He accuses them of being so despotic, that, not content with being masters over their own ways and habits, they would be masters over his also; and grumble because he will not let them. He merely asks the same freedom which they exercise; they, however, propose to regulate his course as well as their own—to cut and clip his mode of life into agreement with their approved pattern; and then charge him with wilfulness and selfishness, because he does not quietly submit! He warns them that he shall resist, nevertheless; and that he shall do so, not only for the assertion of his own independence, but for their good. He tells them that they are slaves, and know it not; that they are shackled, and kiss their chains; that they have lived all their days in prison, and complain because the walls are being broken down. He says he must persevere, however, with a view to his own release; and, in spite of their present expostulations, he prophesies that when they have recovered from the fright which the prospect of freedom produces, they will thank him for aiding in their emancipation.

Unamiable as seems this find-fault mood, offensive as is this defiant attitude, we must beware of overlooking the truths enunciated, in dislike of the advocacy. It is an unfortunate hindrance to all innovation, that in virtue of their very function, the innovators stand in a position of antagonism; and the disagreeable manners, and sayings, and doings, which this antagonism generates, are commonly associated with the doctrines promulgated. Quite forgetting that whether the thing attacked be good or bad, the combative spirit is necessarily repulsive; and quite forgetting that the toleration of abuses seems amiable merely from its passivity; the mass of men contract a bias against advanced views, and in favour of stationary ones, from intercourse with their respective adherents. "Conservatism," as Emerson says, "is debonair and social; reform is individual and imperious." And this remains true, however vicious the system conserved, however righteous the reform to be effected. Nay, the indignation of the purists is usually extreme in proportion as the evils to be got rid of are great. The more urgent the required change, the more intemperate is the vehemence of its promoters. Let no one, then, confound with the principles of this social nonconformity the acerbity and the disagreeable self-assertion of those who first display it.

The most plausible objection raised against resistance to conventions, is grounded on its impolicy, considered even from the progressist's point of view. It is urged by many of the more liberal and intelligent—usually those who have themselves shown some independence of behaviour in earlier days—that to rebel in these small matters is to destroy your own power of helping on reform in greater matters. "If you show yourself eccentric in manners or dress, the world," they say, "will not listen to you. You will be considered as crotchety, and impracticable. The opinions you express on important subjects, which

might have been treated with respect had you conformed on minor points, will now inevitably be put down among your singularities; and thus, by dissenting in trifles, you disable yourself from spreading dissent in essentials."

Only noting, as we pass, that this is one of those anticipations which bring about their own fulfilment—that it is because most who disapprove these conventions do not show their disapproval, that the few who do show it look eccentric—and that did all act out their convictions, no such argument as the above would have force;—noting this as we pass, we go on to reply that these social restraints are not small evils but among the greatest. Estimate their sum total, and we doubt whether they would not exceed most others. Could we add up the trouble, the cost, the jealousies, vexations, misunderstandings, the loss of time and the loss of pleasure, which these conventions entail—we should perhaps come to the conclusion that the tyranny of Mrs. Grundy is worse than any other tyranny. Let us look at a few of its hurtful results; beginning with those of minor importance.

It produces extravagance. The desire to be *comme il faut*, which underlies all conformities, whether of manners, dress, or styles of entertainment, is the desire which makes many a spendthrift and many a bankrupt. To "keep up appearances," to have a house in an approved quarter furnished in the latest taste, to give expensive dinners and crowded *soirées*, is an ambition forming the natural outcome of the conformist spirit. It is needless to enlarge on these follies: they have been satirized by hosts of writers, and in every drawing-room. All which here concerns us, is to point out that the respect for social observances, which men think so praiseworthy, has the same root with this effort to be fashionable in mode of living; and that, other things equal, the last cannot be diminished without the first being diminished also. If, now, we consider what this extravagance entails—if we count up the robbed tradesmen, the stinted governesses, the ill-educated children, the fleeced relatives, who have to suffer from it—if we mark the anxiety and the many moral delinquencies which its perpetrators involve themselves in; we shall see that this regard for conventions is not quite so innocent as it looks.

Again, it decreases the amount of social intercourse. Passing over the reckless, and those who make a great display on speculation with the occasional result of getting on in the world to the exclusion of better men, we come to the far larger class who, being prudent and honest enough not to exceed their means, and yet wishing to be "respectable," are obliged to limit their entertainments to the smallest possible number; and that each of these may be turned to the greatest advantage in meeting the claims on their hospitality, issue their invitations with little or no regard to the comfort or mutual fitness of their guests. A few inconveniently-large assemblies, made up of people mostly strange to each other or but distantly acquainted, are made to serve in place of many small parties of friends intimate enough to have some bond of sympathy. Thus the quantity of intercourse is diminished, and the quality deteriorated. Because it is the custom to make costly preparations and provide costly refreshments; and because it entails both less expense and less trouble to do this for many persons on few occasions than for few persons on many occasions; the reunions of our less wealthy classes are rendered alike infrequent and tedious.

Let it be further observed, that the existing formalities of social intercourse drive away many who most need its refining influence; and drive them into injurious habits and associations. Not a few men, and not the least sensible men either, give up in disgust this going out to stately dinners and stiff evening-parties; and instead, seek society in clubs, and cigar-divans, and taverns. "I'm sick of this standing about in

drawing-rooms, talking nonsense, and trying to look happy," will answer one of them when taxed with his desertion. "Why should I any longer waste time and money, and temper? Once I was ready enough to rush home from the office to dress; I sported embroidered shirts, submitted to tight boots, and cared nothing for tailors' and haberdashers' bills. I know better now. My patience lasted a good while; for though I found each night pass stupidly, I always hoped the next would make amends. But I'm undeceived. Cab-hire and kid gloves cost more than any evening party pays for; or rather—it is worth the cost of them to avoid the party. No, no; I'll no more of it. Why should I pay five shillings a time for the privilege of being bored?" If, now, we consider that this very common mood tends towards billiard-rooms, towards long sittings over cigars and brandy-and-water, towards Evans's and the Coal Hole; it becomes a question whether these precise observances which hamper our set meetings, have not to answer for much of the prevalent dissoluteness. Men must have excitements of some kind or other; and if debarred from higher ones will fall back upon lower. It is not that those who thus take to irregular habits are essentially those of low tastes. Often it is quite the reverse. Among half a dozen intimate friends, abandoning formalities and sitting at ease round the fire, none will enter with greater enjoyment into the highest kind of social intercourse—the genuine communion of thought and feeling; and if the circle includes women of intelligence and refinement, so much the greater is their pleasure. It is because they will no longer be choked with the mere dry husks of conversation which society offers them, that they fly its assemblies, and seek those with whom they may have discourse that is at least real, though unpolished. The men who thus long for substantial mental sympathy, and will go where they can get it, are often, indeed, much better at the core than the men who are content with the inanities of gloved and scented party-goers—men who feel no need to come morally nearer to their fellow-creatures than they can come while standing, tea-cup in hand, answering trifles with trifles; and who, by feeling no such need, prove themselves shallow-thoughted and cold-hearted. It is true that some who shun drawing-rooms do so from inability to bear the restraints prescribed by a genuine refinement, and that they would be greatly improved by being kept under these restraints. But it is not less true that, by adding to the legitimate restraints, which are based on convenience and a regard for others, a host of factitious restraints based only on convention, the refining discipline, which would else have been borne with benefit, is rendered unbearable, and so misses its end. Excess of government defeats itself by driving away those to be governed. And if over all who desert its entertainments in disgust either at their emptiness or their formality, society thus loses its salutary influence—if such not only fail to receive that moral culture which the company of ladies, when rationally regulated, would give them, but, in default of other relaxation, are driven into habits and companionships which often end in gambling and drunkenness; must we not say that here, too, is an evil not to be passed over as insignificant?

Then consider what a blighting effect these multitudinous preparations and ceremonies have upon the pleasures they profess to subserve. Who, on calling to mind the occasions of his highest social enjoyments, does not find them to have been wholly informal, perhaps impromptu? How delightful a pic-nic of friends, who forget all observances save those dictated by good nature! How pleasant the unpretending gatherings of small book societies, and the like; or those purely accidental meetings of a few people well known to each other! Then, indeed, we may see that "a man sharpeneth the

countenance of his friend." Cheeks flush, and eyes sparkle. The witty grow brilliant, and even the dull are excited into saying good things. There is an overflow of topics; and the right thought, and the right words to put it in, spring up unsought. Grave alternates with gay: now serious converse, and now jokes, anecdotes, and playful raillery. Everyone's best nature is shown; everyone's best feelings are in pleasurable activity; and, for the time, life seems well worth having. Go now and dress for some half-past eight dinner, or some ten o'clock "at home"; and present yourself in spotless attire, with every hair arranged to perfection. How great the difference! The enjoyment seems in the inverse ratio of the preparation. These figures, got up with such finish and precision, appear but half alive. They have frozen each other by their primness; and your faculties feel the numbing effects of the atmosphere the moment you enter it. All those thoughts, so nimble and so apt awhile since, have disappeared—have suddenly acquired a preternatural power of eluding you. If you venture a remark to your neighbour, there comes a trite rejoinder, and there it ends. No subject you can hit upon outlives half a dozen sentences. Nothing that is said excites any real interest in you; and you feel that all you say is listened to with apathy. By some strange magic, things that usually give pleasure seem to have lost all charm. You have a taste for art. Weary of frivolous talk, you turn to the table, and find that the book of engravings and the portfolio of photographs are as flat as the conversation. You are fond of music. Yet the singing, good as it is, you hear with utter indifference; and say "Thank you" with a sense of being a profound hypocrite. Wholly at ease though you could be, for your own part, you find that your sympathies will not let you. You see young gentlemen feeling whether their ties are properly adjusted, looking vacantly round, and considering what they shall do next. You see ladies sitting disconsolately, waiting for some one to speak to them, and wishing they had the wherewith to occupy their fingers. You see the hostess standing about the doorway, keeping a factitious smile on her face, and racking her brain to find the requisite nothings with which to greet her guests as they enter. You see numberless traits of weariness and embarrassment; and, if you have any fellow feeling, these cannot fail to produce a sense of discomfort. The disorder is catching; and do what you will, you cannot resist the general infection. You struggle against it; you make spasmodic efforts to be lively; but none of your sallies or your good stories do more than raise a simper or a forced laugh: intellect and feeling are alike asphyxiated. And when, at length, yielding to your disgust, you rush away, how great is the relief when you get into the fresh air, and see the stars! How you "Thank God, that's over!" and half resolve to avoid all such boredom for the future! What, now, is the secret of this perpetual miscarriage and disappointment? Does not the fault lie with these needless adjuncts—these elaborate dressings, these set forms, these expensive preparations, these many devices and arrangements that imply trouble and raise expectation? Who that has lived thirty years in the world has not discovered that Pleasure is coy; and must not be too directly pursued, but must be caught unawares? An air from a street-piano, heard while at work, will often gratify more than the choicest music played at a concert by the most accomplished musicians. A single good picture seen in a dealer's window, may give keener enjoyment than a whole exhibition gone through with catalogue and pencil. By the time we have got ready our elaborate apparatus by which to secure happiness, the happiness is gone. It is too subtle to be contained in these receivers, garnished with compliments, and fenced round with etiquette. The more we multiply and complicate

appliances, the more certain are we to drive it away. The reason is patent enough. These higher emotions to which social intercourse ministers, are of extremely complex nature; they consequently depend for their production upon very numerous conditions; the more numerous the conditions, the greater the liability that one or other of them will not be fulfilled. It takes a considerable misfortune to destroy appetite; but cordial sympathy with those around may be extinguished by a look or a word. Hence it follows, that the more multiplied the *unnecessary* requirements with which social intercourse is surrounded, the less likely are its pleasures to be achieved. It is difficult enough to fulfil continuously all the *essentials* to a pleasurable communion with others: how much more difficult, then, must it be continuously to fulfil a host of *non-essentials* also! What chance is there of getting any genuine response from the lady who is thinking of your stupidity in taking her in to dinner on the wrong arm? How are you likely to have agreeable converse with the gentleman who is fuming internally because he is not placed next to the hostess? Formalities, familiar as they may become, necessarily occupy attention—necessarily multiply the occasions for mistake, misunderstanding, and jealousy, on the part of one or other—necessarily distract all minds from the thoughts and feelings which should occupy them—necessarily, therefore, subvert those conditions under which only any sterling intercourse is to be had.

And this, indeed, is the fatal mischief which these conventions entail—a mischief to which every other is secondary. They destroy those pleasures which they profess to subserve. All institutions are alike in this, that however useful, and needful even, they originally were, they in the end cease to be so, but often become detrimental. While humanity is growing, they continue fixed; daily get more mechanical and unvital; and by and by tend to strangle what they before preserved. Old forms of government finally grow so oppressive, that they must be thrown off even at the risk of reigns of terror. Old creeds end in being dead formulas, which no longer aid but distort and arrest the general mind; while the State-churches administering them, come to be instruments for subsidizing conservatism and repressing progress. Old schemes of education, incarnated in public schools and colleges, continue filling the heads of new generations with what has become relatively useless knowledge, and, by consequence, excluding knowledge which is useful. Not an organization of any kind—political, religious, literary, philanthropic—but what, by its ever-multiplying regulations, its accumulating wealth, its yearly addition of officers, and the creeping into it of patronage and party feeling, eventually loses its original spirit, and sinks into a lifeless mechanism, worked with a view to private ends—a mechanism which not merely fails of its first purpose, but is a positive hindrance to it. Thus is it, too, with social usages. We read of the Chinese that they have "ponderous ceremonies transmitted from time immemorial," which make social intercourse a burden. The court forms prescribed by monarchs for their own exaltation, have, in all times and places, ended in consuming the comfort of their lives. And so the artificial observances of the dining-room and saloon, in proportion as they are many and strict, extinguish that agreeable communion which they were intended to secure. The dislike with which people commonly speak of society that is "formal," and "stiff," and "ceremonious," implies a general recognition of this fact; and this recognition involves the inference that all usages of behaviour which are not based on natural requirements, are injurious. That these conventions defeat their own ends is no new assertion. Swift, criticising the manners of his day, says—"Wise men are often more uneasy at the over-civility of these refiners than they could possibly

be in the conversation of peasants and mechanics."

But it is not only in these details that the self-defeating action of our arrangements is traceable; it is traceable in the very substance and nature of them. Our social intercourse, as commonly managed, is a mere semblance of the reality sought. What is it that we want? Some sympathetic converse with our fellow-creatures:—some converse that shall not be mere dead words, but the vehicle of living thoughts and feelings—converse in which the eyes and the face shall speak, and the tones of the voice be full of meaning—converse which shall make us feel no longer alone, but shall draw us closer to others, and double our own emotions by adding their's to them. Who is there that has not, from time to time, felt how cold and flat is all this talk about politics and science, and the new books and the new men, and how a genuine utterance of fellow-feeling outweighs the whole of it? Mark the words of Bacon:—"For a crowd is not company, and faces are but a gallery of pictures, and talk but a tinkling cymbal, where there is no love." If this be true, then it is only after acquaintance has grown into intimacy, and intimacy has ripened into friendship, that the real communion which men need becomes possible. A rationally-formed circle must consist almost wholly of those on terms of familiarity and regard, with but one or two strangers. What folly, then, underlies the whole system of our grand dinners, our "at homes," our evening parties—crowds made up of many who never met before, many who just bow to one another, many who though well known feel mutual indifference, with just a few real friends lost in the general mass! You need but look round at the artificial expressions of face, to see at once how it is. All have their disguises on; and how can there be sympathy between masks? No wonder that in private every one exclaims against the stupidity of these gatherings. No wonder that hostesses get them up rather because they must than because they wish. No wonder that the invited go less from the expectation of pleasure than from fear of giving offence. The whole thing is an organized disappointment.

And then note, lastly, that in this case, as in others, an organisation inoperative for its proper purpose, it is employed for quite other purposes. What is the usual plea put in for giving and attending these tedious assemblies? "I admit that they are dull and frivolous enough," replies every man to your criticisms; "but then, you know, one must keep up one's connexions." And could you get from his wife a sincere answer, it would be—"Like you, I am sick of these formal parties; but then, we must get our daughters married." The one knows that there is a profession to push, a business to extend; or parliamentary influence, or county patronage, or votes, or office, to be got: position, berths, favours, profit. The other's thoughts run upon husbands and settlements, wives and dowries. Worthless for their ostensible purpose of daily bringing human beings into pleasurable relations with each other, these cumbrous appliances of our social intercourse are now perseveringly kept in action with a view to the pecuniary and matrimonial results which they indirectly produce.

Who then shall say that the reform of our system of observances is unimportant? When we see how this system induces fashionable extravagance, with its occasional ruin—when we mark how greatly it limits the amount of social intercourse among the less wealthy classes—when we find that many who most need to be disciplined by mixing with the refined are driven away by it, and led into bad courses—when we count up the many minor evils it inflicts, the extra work which its costliness entails on all professional and mercantile men, the damage to public taste in dress and decoration by the setting up of its absurdities as standards for imitation, the injury to health indicated in the faces of its devotees at the close of the

London season, the mortality of milliners and the like, which its sudden exigencies yearly involve;—and when to all these we add its fatal sin, that it withers up and kills that high enjoyment it professedly ministers to—shall we not conclude that to rationalize etiquette and fashion, is an aim yielding to few in urgency?

There needs, then, a protestantism in social usages. Forms which have ceased to facilitate and have become obstructive—have to be swept away. Signs are not wanting that some change is at hand. A host of satirists, led on by Thackeray, have long been engaged in bringing our sham-festivities, and our fashionable follies, into contempt; and in their candid moods, most men laugh at the frivolities with which they and the world in general are deluded. Ridicule has always been a revolutionary agent. Institutions that have lost their roots in men's respect and faith are doomed; and the day of their dissolution is not far off. The time is approaching, then, when our system of social observances must pass through some crisis, out of which it will come purified and comparatively simple.

How this crisis will be brought about, no one can say. Whether by the continuance and increase of individual protests, or whether by the union of many persons for the practice and diffusion of better usages, the future alone can decide. The influence of dissentients acting without co-operation, seems inadequate. Frowned on by conformists, and expostulated with even by those who secretly sympathize with them; subject to petty persecutions, and unable to trace any benefit produced by their example; they are apt, one by one, to give up their attempts as hopeless. The young convention-breaker eventually finds that he pays too heavily for his nonconformity. Hating, for example, everything that bears about it any remnant of servility, he determines, in the ardour of his independence, that he will uncover to no one. But what he means simply as a general protest, he finds that ladies interpret into a personal disrespect. In other cases his courage fails him. Such of his unconventionalities as can be attributed only to eccentricity, he has no qualms about; for, on the whole, he feels rather complimented than otherwise in being considered a disregarder of public opinion. But when they are liable to be put down to ignorance, to ill-breeding, or to poverty, he becomes a coward. However clearly the recent innovation of eating some kinds of fish with knife and fork proves the fork-and-bread practice to have had little but caprice for its basis, yet he dares not wholly ignore that practice while fashion partly maintains it.[1] Though he thinks that a silk handkerchief is quite as appropriate for drawing-room use as a white cambric one, he is not altogether at ease in acting out his opinion. Then, too, he begins to perceive that his resistance to prescription brings round disadvantageous results which he had not calculated upon. He had expected that it would save him from a great deal of social intercourse of a frivolous kind—that it would offend the silly people, but not the sensible people; and so would serve as a self-acting test by which those worth knowing would be separated from those not worth knowing. But the silly people prove to be so greatly in the majority that, by offending them, he closes against himself nearly all the avenues through which the sensible people are to be reached. Thus he finds, that his nonconformity is frequently misinterpreted; that there are but few directions in which he dares to carry it consistently out; that the disadvantages it entails are greater than he anticipated; and that the chances of his doing any good are very remote. Hence he gradually loses resolution, and lapses, step by step, into the ordinary routine of observances.

Abortive as individual protests thus

[1] This was written before the introduction of silver fish-knives.

generally turn out, it may possibly be that nothing effectual will be done until there arises some organized resistance to this invisible despotism, by which our modes and habits are dictated. It may happen, that the government of Manners and Fashion will be rendered less tyrannical, as the political and religious governments have been, by some antagonistic union. Alike in Church and State, men's first emancipations from excesses of restriction were achieved by numbers, bound together by a common creed or a common political faith. What remained undone while there were but individual schismatics or rebels, was effected when there came to be many acting in concert. It is tolerably clear that these earliest instalments of freedom could not have been obtained in any other way; for so long as the feeling of personal independence was weak and the rule strong, there could never have been a sufficient number of separate dissentients to produce the desired results. Only in these later times, during which the secular and spiritual controls have been growing less coercive, and the tendency towards individual liberty greater, has it become possible for smaller and smaller sects and parties to fight against established creeds and laws; until now men may safely stand even alone in their antagonism. The failure of individual nonconformity to customs, suggests that an analogous series of changes may have to be gone through in this case also. It is true that the *lex non scripta* differs from the *lex scripta* in this, that, being unwritten, it is more readily altered; and that it has, from time to time, been quietly ameliorated. Nevertheless, we shall find that the analogy holds substantially good. For in this case, as in the others, the essential revolution is not the substituting of any one set of restraints for any other, but the limiting or abolishing the authority which prescribes restraints. Just as the fundamental change inaugurated by the Reformation, was not a superseding of one creed by another, but an ignoring of the arbiter who before dictated creeds—just as the fundamental change which Democracy long ago commenced, was not from this particular law to that, but from the despotism of one to the freedom of all; so, the parallel change yet to be wrought out in this supplementary government of which we are treating, is not the replacing of absurd usages by sensible ones, but the dethronement of that power which now imposes our usages, and the assertion of the rights of individuals to choose their own usages. In rules of living, a West-end clique is our Pope; and we are all papists, with but a mere sprinkling of heretics. On those who decisively rebel, comes down the penalty of excommunication, with its long catalogue of disagreeable and, indeed, serious consequences. The liberty of the subject asserted in our constitution, and ever on the increase, has yet to be wrested from this subtler tyranny. The right of private judgment, which our ancestors wrung from the church, remains to be claimed from this dictator of our habits. Or, as before said, to free us from these idolatries and superstitious conformities, there has still to come a protestantism in social usages. Parallel, therefore, as is the change to be wrought out, it seems not improbable that it may be wrought out in an analogous way. That influence which solitary dissentients fail to gain, and that perseverance which they lack, may come into existence when they unite. That persecution which the world now visits upon them from mistaking their nonconformity for ignorance or disrespect, may diminish when it is seen to result from principle. The penalty which exclusion now entails may disappear when they become numerous enough to form visiting circles of their own. And when a successful stand has been made, and the brunt of the opposition has passed, that large amount of secret dislike to our observances which now pervades society, may manifest itself with sufficient power to effect the desired emancipation.

Whether such will be the process,

time alone can decide. That community of origin, growth, supremacy, and decadence, which we have found among all kinds of government, suggests a community in modes of change also. On the other hand, Nature often performs substantially similar operations, in ways apparently different. Hence these details can never be foretold.

Meanwhile, let us glance at the conclusions that have been reached. On the one side, government, originally one, and afterwards subdivided for the better fulfilment of its function, must be considered as having ever been, in all its branches—political, religious, and ceremonial—beneficial; and, indeed, absolutely necessary. On the other side, government, under all its forms, must be regarded as subserving an office, made needful by the unfitness of aboriginal humanity for social life; and the successive diminutions of its coerciveness in State, in Church, and in Custom, must be looked upon accompanying the increasing adaptation of humanity to its conditions. To complete the conception, there requires to be borne in mind the third fact, that the genesis, the maintenance, and the decline of all governments, however named, are alike brought about by the humanity to be controlled; from which may be drawn the inference that, on the average, restrictions of every kind cannot last much longer than they are wanted, and cannot be destroyed much faster than they ought to be. Society, in all its developments, undergoes the process of exuviation. These old forms which it successively throws off, have all been once vitally united with it—have severally served as the protective envelopes within which a higher humanity was being evolved. They are cast aside only when they become hindrances—only when some inner and better envelope has been formed; and they bequeath to us all that there was in them of good. The periodical abolitions of tyrannical laws have left the administration of justice not only uninjured, but purified. Dead and buried creeds have not carried with them the essential morality they contained, which still exists, uncontaminated by the sloughs of superstition. And all that there is of justice and kindness and beauty, embodied in our cumbrous forms of etiquette, will live perennially when the forms themselves have been forgotten.

MILL *VERSUS* HAMILTON—THE TEST OF TRUTH

(1865)

BRITISH speculation, to which the chief initial ideas and established truths of Modern Philosophy are due, is no longer dormant. By his *System of Logic*, Mr. Mill probably did more than any other writer to re-awaken it. And to the great service he thus rendered some twenty years ago, he now adds by his *Examination of Sir William Hamilton's Philosophy*—a work which, taking the views of Sir William Hamilton as texts, reconsiders sundry ultimate questions that still remain unsettled.

Among these questions is one of much importance which has already been the subject of controversy between Mr. Mill and others; and this question I propose to discuss afresh. Before doing so, however, it will be desirable to glance at two cardinal doctrines of the

Hamiltonian philosophy from which Mr. Mill shows reasons for dissenting—desirable, because comment on them will elucidate what is to follow.

In his fifth chapter, Mr. Mill points out that "what is rejected as knowledge by Sir William Hamilton," is "brought back by him under the name of belief." The quotations justify this description of Sir W. Hamilton's position, and warrant the assertion that the relativity of knowledge was held by him but nominally. His inconsistency may, I think, be traced to the use of the word "belief" in two quite different senses. We commonly say we "believe" a thing for which we can assign preponderating evidence, or concerning which we have received some indefinable impression. We *believe* that the next House of Commons will not abolish Church-rates; or we *believe* that a person on whose face we look is good-natured. That is, when we can give confessedly-inadequate proofs or no proofs at all for the things we think, we call them "beliefs." And it is the peculiarity of these beliefs, as contrasted with cognitions, that their connexions with antecedent states of consciousness may be easily severed, instead of being difficult to sever. But, unhappily, the word "belief" is also applied to each of those temporarily or permanently indissoluble connexions in consciousness, for the acceptance of which the only warrant is that it cannot be got rid of. Saying that I feel a pain, or hear a sound, or see one line to be longer than another, is saying that there has occurred in me a certain change of state; and it is impossible for me to give a stronger evidence of this fact than that it is present to my mind. Every argument, too, is resolvable into successive affections of consciousness which have no warrants beyond themselves. When asked why I assert some mediately known truth, as that the three angles of a triangle are equal to two right angles, I find that the proof may be decomposed into steps, each of which is an immediate consciousness that certain two quantities or two relations are equal or unequal—a consciousness for which no further evidence is assignable than that it exists in me. Nor, on finally getting down to some axiom underlying the whole fabric of demonstration, can I say more than that it is a truth of which I am immediately conscious. But now observe the confusion that has arisen. The immense majority of truths which we accept as beyond doubt, and from which our notion of unquestionable truth is abstracted, have this other trait in common—they are severally established by affiliation on deeper truths. These two characters have become so associated, that one seems to imply the other. For each truth of geometry we are able to assign some wider truth in which it is involved; for that wider truth we are able, if required, to assign some still wider; and so on. This being the general nature of the demonstration by which exact knowledge is established, there has arisen the illusion that knowledge so established is knowledge of higher validity than that immediate knowledge which has nothing deeper to rest on. The habit of asking for proof, and having proof given, in all these multitudinous cases, has produced the implication that proof may be asked for those ultimate dicta of consciousness into which all proof is resolvable. And then, because no proof of these can be given, there arises the vague feeling that they are akin to other things of which no proof can be given—that they are uncertain—that they have unsatisfactory bases. This feeling is strengthened by the accompanying misuse of words. "Belief" having, as above pointed out, become the name of an impression for which we can give only a confessedly-inadequate reason, or no reason at all; it happens that when pushed hard respecting the warrant for any ultimate dictum of consciousness, we say, in the absence of all assignable reason, that we *believe* it. Thus the two opposite poles of knowledge go under the same name; and by the reverse connotations of this

name, as used for the most coherent and least coherent relations of thought, profound misconceptions have been generated. Here, it seems to me, is the source of Sir William Hamilton's error. Classing as "beliefs" those direct, undecomposable dicta of consciousness which transcend proof, he asserts that these are of higher authority than knowledge (meaning by knowledge that for which reasons can be given); and in asserting this he is fully justified. But when he claims equal authority for those affections of consciousness which go under the same name of "beliefs," but differ in being extremely-indirect affections of consciousness, or not definite affections of consciousness at all, the claim cannot be admitted. By his own showing, no positive cognition answering to the word "infinite" exists; while, contrariwise, those cognitions which he rightly holds to be above question, are not only positive, but have the peculiarity that they cannot be suppressed. How, then, can the two be grouped together as of like degrees of validity?

Nearly allied in nature to this, is another Hamiltonian doctrine, which Mr. Mill effectively combats. I refer to the corollary respecting noumenal existence which Sir William Hamilton draws from the law of the Excluded Middle, or, as it might be more intelligibly called, the law of the Alternative Necessity. A thing must either exist or not exist—must have a certain attribute or not have it: there is no third possibility. This is a postulate of all thought; and in so far as it is alleged of phenomenal existence, no one calls it in question. But Sir William Hamilton, applying the formula beyond the limits of thought, draws from it certain conclusions respecting things as they are, apart from our consciousness. He says, for example, that though we cannot conceive Space as infinite or as finite, yet, "on the principle of the Excluded Middle, one or other must be admitted." This inference Mr. Mill shows good reason for rejecting. His argument may be supplemented by another, which at once suggests itself if from the words of Sir William Hamilton's propositions we pass to the thoughts for which they are supposed to stand. When remembering a certain thing as in a certain place, the place and the thing are mentally represented together; while to think of the non-existence of the thing in that place, implies a consciousness in which the place is represented but not the thing. Similarly, if, instead of thinking of an object as colourless, we think of it as having colour, the change consists in the addition to the concept of an element that was before absent from it—the object cannot be thought of first as red and then as not red, without one component of the thought being expelled from the mind by another. The doctrine of the Excluded Middle, then, is simply a generalization of the universal experience that some mental states are directly destructive of other states. It formulates a certain absolutely-constant law, that no positive mode of consciousness can occur without excluding a correlative negative mode; and that the negative mode cannot occur without excluding the correlative positive mode: the antithesis of positive and negative, being, indeed, merely an expression of this experience. Hence it follows that if consciousness is not in one of the two modes, it must be in the other. But now, under what conditions only can this law of consciousness hold? It can hold only so long as there are positive states of consciousness which can exclude the negative states, and which the negative states can in their turn exclude. If we are not concerned with positive states of consciousness at all, no such mutual exclusion takes place, and the law of the Alternative Necessity does not apply. Here, then, is the flaw in Sir William Hamilton's proposition. That Space must be infinite or finite, are alternatives of which we are not obliged to regard one as necessary; seeing that we have no state of consciousness answering to either of these words as applied to the

totality of Space, and therefore no exclusion of two antagonist states of consciousness by one another. Both alternatives being unthinkable, the proposition should be put thus: Space is either   or is   ; neither of which can be conceived, but one of which must be true. In this, as in some other cases, Sir William Hamilton continues to work out the forms of thought when they no longer contain any substance; and, of course, reaches nothing more than verbal conclusions.

Ending here these comments on doctrines of Sir William Hamilton, which Mr. Mill rejects on grounds that will be generally recognized as valid, let me now pass to a doctrine, partly held by Sir William Hamilton, and held by others in ways variously qualified and variously extended—a doctrine which, I think, may be successfully defended against Mr. Mill's attack.

In the fourth and fifth editions of his *Logic*, Mr. Mill treats, at considerable length, the question—Is inconceivability an evidence of untruth?—replying to criticisms previously made on his reasons for asserting that it is not. The chief answers which he there makes to these criticisms, turn upon the interpretation of the word *inconceivable*. This word he considers is used as the equivalent of the word *unbelievable*; and, translating it thus, readily disposes of sundry arguments brought against him. Whether any others who have used these words in philosophical discussion, have made them synonymous, I do not know; but that they are so used in those reasonings of my own which Mr. Mill combats, I was not conscious, and was surprised to find alleged. It is now manifest that I had not adequately guarded myself against the misconstruction which is liable to arise from the double meaning of the word *belief*—a word which, we have seen, is used for the most coherent and the least coherent connexions in consciousness, because they have the common character that no reason is assignable for them. Throughout the argument to which Mr. Mill replies, the word is used by me only in the first of these senses. The "invariably existent beliefs," the "indestructible beliefs," are the indissoluble connexions in consciousness—never the dissoluble ones. But *unbelievable* implies the dissoluble ones. By association with the other and more general meaning of the word *belief*, the word *unbelievable* suggests cases in which the proposition admits of being represented in thought, though it may be with difficulty; and in which, consequently, the counter-proposition admits of being decomposed. To be quite sure of our ground, let us define and illustrate the meanings of *inconceivable* and *unbelievable*. An inconceivable proposition is one of which the terms cannot, by any effort, be brought before consciousness in that relation which the proposition asserts between them—a proposition of which the subject and the predicate offer an insurmountable resistance to union in thought. An unbelievable proposition is one which admits of being framed in thought, but is so much at variance with experience that its terms cannot be put in the alleged relation without effort. Thus, it is unbelievable that a cannon-ball fired from England should reach America; but it is not inconceivable. Conversely, it is inconceivable that one side of a triangle is equal to the sum of the other two sides—not simply unbelievable. The two sides cannot be represented in consciousness as becoming equal in their joint length to the third side, without the representation of a triangle being destroyed; and the concept of a triangle cannot be framed without a simultaneous destruction of a concept in which these magnitudes are represented as equal. That is to say, the subject and predicate cannot be united in the same intuition—the proposition is unthinkable. It is in this sense only that I have used the word inconceivable; and only when rigorously restricted to this sense do I regard the test of inconceivableness as having any value.

I had concluded that when this explanation was made, Mr. Mill's reasons for dissent would be removed. Passages in his recently-published volume, however, show that, even restricting the use of the word inconceivable to the meaning here specified, he still denies that a proposition is proved to be true by the inconceivableness of its negation. To meet, within any moderate compass, all the issues which have grown out of the controversy, is difficult. Before passing to the essential question, however, I will endeavour to clear the ground of certain minor questions.

Describing Sir William Hamilton's doctrine respecting the ultimate facts of consciousness, or those which are above proof, Mr. Mill writes:

"The only condition he requires is that we be not able to 'reduce it [a fact of this class] to a generalization from experience.' This condition is realized by its possessing the 'character of necessity.' 'It must be impossible not to think of it. In fact, by its necessity alone can we recognize it as an original datum of intelligence, and distinguish it from any mere result of generalization and custom.' In this Sir William Hamilton is at one with the whole of his own section of the philosophical world; with Reid, with Stewart, with Cousin, with Whewell, we may add, with Kant, and even with Mr. Herbert Spencer. The test by which they all decide a belief to be a part of our primitive consciousness—an original intuition of the mind—is the necessity of thinking it. Their proof that we must always, from the beginning, have had the belief, is the impossibility of getting rid of it now. This argument, applied to any of the disputed questions of philosophy, is doubly illegitimate: neither the major nor the minor premise is admissible. For in the first place, the very fact that the question is disputed, disproves the alleged impossibility. Those against whom it is needful to defend the belief which is affirmed to be necessary, are unmistakable examples that it is not necessary. . . . These philosophers, therefore, and among them Sir William Hamilton, mistake altogether the true conditions of psychological investigation, when, instead of proving a belief to be an original fact of consciousness by showing that it could not have been acquired, they conclude that it was not acquired, for the reason, often false, and never sufficiently substantiated, that our consciousness cannot get rid of it now."

This representation, in so far as it concerns my own views, has somewhat puzzled me. Considering that I have avowed a general agreement with Mr. Mill in the doctrine that all knowledge is from experience, and have defended the test of inconceivableness on the very ground that it expresses "the net result of our experiences up to the present time" (*Principles of Psychology*, § 430)—considering that, so far from asserting the distinction quoted from Sir William Hamilton, I have aimed to abolish such distinction—considering that I have endeavoured to show how all our conceptions, even down to those of Space and Time, are "acquired"—considering that I have sought to interpret forms of thought (and by implication all intuitions) as products of organized and inherited experiences (*Principles of Psychology*, § 208); I am taken aback at finding myself classed as in the above paragraph. Leaving the personal question, however, let me pass to the assertion that the difference of opinion respecting the test of necessity itself disproves the validity of the test. Two issues are here involved. First, if a particular proposition is by some accepted as a necessary belief, but by one or more denied to be a necessary belief, is the validity of the test of necessity thereby disproved in respect of that particular proposition? Second, if the validity of the test is disproved in respect of that particular proposition, does it therefore follow that the test cannot be depended on in other cases?—does it follow that there are no beliefs

universally accepted as necessary, and in respect of which the test of necessity is valid? Each of these questions may, I think, be rightly answered in the negative.

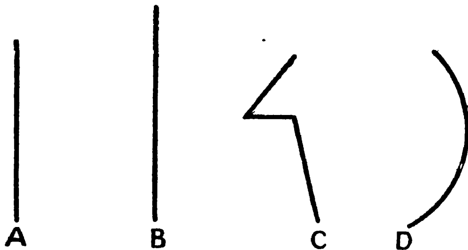
In alleging that if a belief is said by some to be necessary, but by others to be not necessary, the test of necessity is thereby shown to be no test, Mr. Mill tacitly assumes that all men have powers of introspection enabling them in all cases to say what consciousness testifies; whereas a great proportion of men are incapable of correctly interpreting consciousness in any but its simplest modes, and even the remainder are liable to mistake for dicta of consciousness what prove on closer examination not to be its dicta. Take the case of an arithmetical blunder. A boy adds up a column of figures, and brings out a wrong total. Again he does it and again errs. His master asks him to go through the process aloud, and then hears him say "35 and 9 are 46"—an error which he had repeated on each occasion. Now without discussing the mental act through which we know that 35 and 9 are 44, and through which we recognize the necessity of this relation, it is clear that the boy's misinterpretation of consciousness, leading him tacitly to deny this necessity by asserting that "35 and 9 are 46," cannot be held to prove that the relation is not necessary. This, and kindred misjudgments daily made by accountants, merely show that there is a liability to overlook what are necessary connexions in our thoughts, and to assume as necessary others which are not. In these and hosts of cases, men do not distinctly translate into their equivalent states of consciousness the words they use. This negligence is with many so habitual, that they are unaware that they have not clearly represented to themselves the propositions they assert; and are then apt, quite sincerely though erroneously, to assert that they can think things which it is really impossible to think.

But supposing it to be true that whenever a particular belief is alleged to be necessary, the existence of some who profess themselves able to believe otherwise, proves that this belief is not necessary; must it be therefore admitted that the test of necessity is invalid? I think not. Men may mistake for necessary, certain beliefs which are not necessary; and yet it may remain true that there *are* necessary beliefs, and that the necessity of such beliefs is our warrant for them. Were conclusions thus tested proved to be wrong in a hundred cases, it would not follow that the test is an invalid one; any more than it would follow from a hundred errors in the use of a logical formula, that the logical formula is invalid. If from the premise that all horned animals ruminate, it were inferred that the rhinoceros, being a horned animal, ruminates; the error would furnish no argument against the worth of syllogisms in general—whatever their worth may be. Daily there are thousands of erroneous deductions which, by those who draw them, are supposed to be warranted by the data from which they draw them; but no multiplication of such erroneous deductions is regarded as proving that there are no deductions truly drawn, and that the drawing of deductions is illegitimate. In these cases, as in the case to which they are here paralleled, the only thing shown is the need for verification of data and criticism of the acts of consciousness.

"This argument," says Mr. Mill, referring to the argument of necessity, "applied to any of the disputed questions of philosophy, is doubly illegitimate; . . . the very fact that the question is disputed, disproves the alleged impossibility." Besides the foregoing replies to this, there is another. Granting that there have been appeals illegitimately made to this test—granting that there are many questions too complex to be settled by it, which men have nevertheless proposed to settle by it, and have consequently got into controversy; it may yet be truly asserted that in

respect of all, or almost all, questions legitimately brought to judgment by this test, there is *no* dispute about the answer. From the earliest times on record down to our own, men have not changed their beliefs concerning the truths of number. The axiom that if equals be added to unequals the sums are unequal, was held by the Greeks no less than by ourselves, as a direct verdict of consciousness, from which there is no escape and no appeal. Each of the propositions of Euclid appears to us absolutely beyond doubt as it did to them. Each step in each demonstration we accept, as they accepted it, because we immediately see that the alleged relation is as alleged, and that it is impossible to conceive it otherwise.

But how are legitimate appeals to the test to be distinguished? The answer is not difficult to find. Mr. Mill cites



the belief in the antipodes as having been rejected by the Greeks because inconceivable, but as being held by ourselves to be both conceivable and true. He has before given this instance, and I have before objected to it (*Principles of Psychology*, § 428), for the reason that the states of consciousness involved in the judgment are too complex to admit of any trustworthy verdict being given. An illustration will show the difference between a legitimate appeal to the test and an illegitimate appeal to it. A and B are two lines. How is it decided that they are equal or not equal? No way is open but that of comparing the two impressions they make on consciousness. I know them to be unequal by an immediate act, if the difference is great, or if, though only moderately different, they are close together; and supposing the difference is but slight, I decide the question by putting the lines in apposition when they are movable, or by carrying a movable line from one to the other if they are fixed. But in any case, I obtain in consciousness the testimony that the impression produced by the one line differs from that produced by the other. Of this difference I can give no further evidence than that I am conscious of it, and find it impossible, while contemplating the lines, to get rid of the consciousness. The proposition that the lines are unequal is a proposition of which the negation is inconceivable. But now suppose it is asked whether B and C are equal; or whether C and D are equal. No positive answer is possible. Instead of its being inconceivable that B is longer than C, or equal to it, or shorter, it is conceivable that it is any one of the three. Here an appeal to the direct verdict of consciousness is illegitimate, because on transferring the attention from B to C, or C to D, the changes in the other elements of the impressions so entangle the elements to be compared, as to prevent them from being put in apposition. If the question of relative length is to be determined, it must be by rectification of the bent line; and this is done through a series of steps, each one of which involves an immediate judgment akin to that by which A and B are compared. Now as here, so in other cases, it is only simple percepts or concepts respecting the relations of which immediate consciousness can satisfactorily testify; and as here, so in other cases, it is by resolution into such simple percepts and concepts, that true judgments respecting complex percepts and concepts are reached. That things which are equal to the same thing are equal to one another, is a fact which can be known by direct comparison of actual or ideal relations, and can be known in no other way: the proposition is one of which the negation is inconceivable, and is

rightly asserted on that warrant. But that the square of the hypotenuse of a right-angled triangle equals the sum of the squares of the other two sides, cannot be known immediately by comparison of two states of consciousness. Here the truth can be reached only mediately, through a series of simple judgments respecting the likenesses or unlikenesses of certain relations: each of which judgments is essentially of the same kind as that by which the above axiom is known, and has the same warrant. Thus it becomes apparent that the fallacious result of the test of necessity which Mr. Mill instances, is due to a misapplication of the test.

These preliminary explanations have served to make clear the question at issue. Let us now pass to the essence of it.

Metaphysical reasoning is usually vitiated by some covert *petitio principii*. Either the thing to be proved or the thing to be disproved, is tacitly assumed to be true in the course of the proof or disproof. It is thus with the argument of Idealism. Though the conclusion reached is that Mind and Ideas are the only existences; yet the steps by which this conclusion is reached, take for granted that external objects have just the kind of independent existence which is eventually denied. If that extension which the Idealist contends is merely an affection of consciousness, has nothing out of consciousness answering to it; then, in each of his propositions concerning extension, the word should always mean an affection of consciousness and nothing more. But if wherever he speaks of distances and dimensions we write ideas of distances and dimensions, his propositions are reduced to nonsense. So, too, is it with Scepticism. The resolution of all knowledge into "impressions" and "ideas," is effected by an analysis which assumes at every step an objective reality producing the impressions and the subjective reality receiving them. The reasoning becomes impossible if the existence of object and subject be not admitted at the outset. Agree with the Sceptic's doubt, and then propose to revise his argument so that it may harmonize with his doubt. Of the two alternatives between which he halts, assume, first, the reality of object and subject. His argument is practicable; whether valid or not. Now assume that object and subject do not exist. He cannot stir a step toward his conclusion—nay, he cannot even state his conclusion; for the word "impression" cannot be translated into thought without assuming a thing impressing and a thing impressed.

Though Empiricism, as at present understood, is not thus suicidal, it is open to an analogous criticism on its method, similarly telling against the validity of its inference. It proposes to account for our so-called necessary beliefs, as well as all our other beliefs; and to do this without postulating any one belief as necessary. Bringing forward abundant evidence that the connexions among our states of consciousness are determined by our experiences—that two experiences frequently recurring together in consciousness, become so coherent that one strongly suggests the other, and that when their joint recurrence is perpetual and invariable, the connexion between them becomes indissoluble; it argues that the indissolubility, so produced, is all that we mean by necessity. And then it seeks to explain each of our so-called necessary beliefs as thus originated. Now could pure Empiricism reach this analysis and its subsequent synthesis without taking any thing for granted, its arguments would be unobjectionable. But it cannot do this. Examine its phraseology, and there arises the question, experiences of *what?* Translate the word into thought, and it clearly involves something more than states of mind and the connexions among them. For if it does not, then the hypothesis is that states of mind are generated by the experiences of states of mind; and if

the inquiry be pursued, this ends with initial states of mind which are not accounted for—the hypothesis fails. Evidently, there is tacitly assumed something beyond the mind by which the "experiences" are produced—something in which exist the objective relations to which the subjective relations correspond—an external world. Refuse thus to explain the word "experiences," and the hypothesis becomes meaningless. But now, having thus postulated an external reality as the indispensable foundation of its reasonings, pure Empiricism can subsequently neither prove nor disprove its postulate. An attempt to disprove it, or to give it any other meaning than that originally involved, is suicidal; and an attempt to establish it by inference is reasoning in a circle. What then are we to say of this proposition on which Empiricism rests? Is it a necessary belief, or is it not? If necessary, the hypothesis in its pure form is abandoned. If not necessary—if not posited *a priori* as absolutely certain—then the hypothesis rests on an uncertainty; and the whole fabric of its argument is unstable. More than this is true. Besides the insecurity implied by building on a foundation that is confessedly not beyond question, there is the much greater insecurity implied by raising proposition upon proposition of which each is confessedly not beyond question. For to say that there are no necessary truths, is to say that each successive inference is not necessarily involved in its premises—is an empirical judgment—a judgment not certainly true. Hence, applying rigorously its own doctrine, we find that pure Empiricism, starting from an uncertainty and progressing through a series of uncertainties, cannot claim much certainty for its conclusions.

Doubtless, it may be replied that any theory of human knowledge must set out with assumptions—either permanent or provisional; and that the validity of these assumptions is to be determined by the results reached through them. But that such assumptions may be made legitimately, two things are required. In the first place they must not be multiplied step after step as occasion requires; otherwise the conclusion reached might as well be assumed at once. And in the second place, the fact that they *are* assumptions must not be lost sight of: the conclusions drawn must not be put forward as though they have a certainty which the premises have not. Now pure Empiricism, in common with other theories of knowledge, is open to the criticism, that it neglects thus avowedly to recognize the nature of those primary assumptions which it lays down as provisionally valid, if it denies that they can be necessarily valid. And it is open to the further criticism, that it goes on at every step in its argument making assumptions which it neglects to specify as provisional; since they, too, cannot be known as necessary. Until it has assigned some warrant for its original datum and for each of its subsequent inferences, or else has acknowledged them all to be but hypothetical, it may be stopped either at the outset or at any stage in its argument. Against every "because" and every "therefore," an opponent may enter a caveat, until he is told why it is asserted: contending, as he may, that if this inference is not necessary he is not bound to accept it; and that if it is necessary it must be openly declared to be necessary, and some test must be assigned by which it is distinguished from propositions that are not necessary.

These considerations will, I think, make it obvious that the first step in a metaphysical argument, rightly carried on, must be an examination of propositions for the purpose of ascertaining what character is common to those which we call unquestionably true, and is implied by asserting their unquestionable truth. Further, to carry on this inquiry legitimately, we must restrict our analysis rigorously to states of consciousness considered in their relations to one another: wholly ignoring

anything beyond consciousness to which these states and their relations may be supposed to refer. For if, before we have ascertained by comparing propositions what is the trait that leads us to class some of them as certainly true, we avowedly or tacitly take for granted the existence of something beyond consciousness; then, a particular proposition is assumed to be certainly true before we have ascertained what is the distinctive character of the propositions which we call certainly true, and the analysis is vitiated. If we cannot transcend consciousness—if, therefore, what we know as truth must be some mental state, or some combination of mental states; it must be possible for us to say in what way we distinguish this state or these states. The definition of truth must be expressible in terms of consciousness; and, indeed, cannot otherwise be expressed if consciousness cannot be transcended. Clearly, then, the metaphysician's first step must be to shut out from his investigation every thing but what is subjective; not taking for granted the existence of any thing objective corresponding to his ideas, until he has ascertained what property of his ideas it is which he predicates by calling them true. Let us note the result if he does this.

The words of a proposition are the signs of certain states of consciousness; and the thing alleged by a proposition is the connexion or disconnexion of the states of consciousness signified. When thinking is carried on with precision—when the mental states which we call words, are translated into the mental states they symbolize (which they very frequently are not)—thinking a proposition consists in the occurrence together in consciousness of the subject and predicate. "The bird was brown," is a proposition which implies the union in thought of a particular attribute with a group of other attributes. When the inquirer compares various propositions thus rendered into states of consciousness, he finds that they differ very greatly in respect of the facility with which the states of consciousness are connected and disconnected. The mental state known as *brown* may be united with those mental states which make up the figure known as *bird*, without appreciable effort, or may be separated from them without appreciable effort: the bird may easily be thought of as black, or green, or yellow. Contrariwise, such an assertion as "The ice was hot," is one to which he finds much difficulty in making his mind respond. The elements of the proposition cannot be put together in thought without great resistance. Between those other states of consciousness which the word *ice* connotes, and the state of consciousness named *cold*, there is an extremely strong cohesion—a cohesion measured by the resistance to be overcome in thinking of the ice as *hot*. Further, he finds that in many cases the states of consciousness grouped together cannot be separated at all. The idea of pressure cannot be disconnected from the idea of something occupying space. Motion cannot be thought of without an object that moves being at the same time thought of. And then, besides these connexions in consciousness which remain absolute under all circumstances, there are others which remain absolute under special circumstances. Between the elements of those more vivid states of consciousness which the inquirer distinguishes as perceptions, he finds that there is a temporarily-indissoluble cohesion. Though when there arises in him that comparatively faint state of consciousness which he calls the idea of a book, he can easily think of the book as red, or brown, or green; yet when he has that much stronger consciousness which he calls seeing a book, he finds that so long as there continue certain accompanying states of consciousness which he calls the conditions to perception, those several states of consciousness which make up the perception cannot be disunited—he cannot

think of the book as red, or green, or brown; but finds that, along with a certain figure, there absolutely coheres a certain colour.

Still shutting himself up within these limits, let us suppose the inquirer to ask himself what he thinks about these various degrees of cohesion among his states of consciousness—how he names them, and how he behaves toward them. If there comes, no matter whence, the proposition—"The bird was brown," subject and predicate answering to these words spring up together in consciousness; and if there is no opposing proposition, he unites the specified and implied attributes without effort, and believes the proposition. If, however, the proposition is—"The bird was necessarily brown," he makes an experiment like those above described, and finding that he can separate the attribute of brownness, and can think of the bird as green or yellow, he does not admit that the bird was necessarily brown. When such a proposition as "The ice was cold" arises in him, the elements of the thought behave as before; and so long as no test is applied, the union of the consciousness of cold with the accompanying states of consciousness, seems to be of the same nature as the union between those answering to the words *brown* and *bird*. But should the proposition be changed into—"The ice was necessarily cold," quite a different result happens from that which happened in the previous case. The ideas answering to subject and predicate are here so coherent, that in the absence of careful examination they might pass as inseparable, and the proposition be accepted. But suppose the proposition is deliberately tested by trying whether ice can be thought of as not cold. Great resistance is offered in consciousness to this. Still, by an effort, he can imagine water to have its temperature of congelation higher than blood heat; and can so think of congealed water as hot instead of cold. Now the extremely strong cohesion of states of consciousness, thus experimentally proved by the difficulty of separating them, he finds to be what he calls a strong belief. Once more, in response to the words—"Along with motion there is something that moves," he represents to himself a moving body; and, until he tries an experiment upon it, he may suppose the elements of the representation to be united in the same way as those of the representations instanced above. But supposing the proposition is modified into—"Along with motion there is necessarily something that moves," the response made in thought to these words, discloses the fact that the states of consciousness called up in this case are indissolubly connected in the way alleged. He discovers this by trying to conceive the negation of the proposition—by trying to think of motion as *not* having along with it something that moves; and his inability to conceive this negation is the obverse of his inability to tear asunder the states of consciousness which constitute the affirmation. Those propositions which survive this strain, are the propositions he distinguishes as necessary. Whether or not he means any thing else by this word, he evidently means that in his consciousness the connexions they predicate are, so far as he can ascertain, unalterable. The bare fact is that he submits to them because he has no choice. They rule his thoughts whether he will or not. Leaving out all questions concerning the origin of these connexions—all theories concerning their significations, there remains in the inquirer the consciousness that certain of his states of consciousness are so welded together that all other links in the chain of consciousness yield before these give way.

Continuing rigorously to exclude everything beyond consciousness, let him now ask himself what he means by reasoning? what is the essential nature of an argument? what is the peculiarity of a conclusion? Analysis soon shows him that reasoning is the formation of a

coherent series of states of consciousness. He has found that the thoughts expressed by propositions, vary in the cohesions of their subjects and predicates; and he finds that at every step in an argument, carefully carried on, he tests the strengths of all the connexions asserted and implied. He considers whether the object named really does belong to the class in which it is included—tries whether he can think of it as *not* like the things it is said to be like. He considers whether the attribute alleged is really possessed by all members of the class—tries to think of some member of the class that has *not* the attribute—and he admits the proposition only on finding, by this criticism, that there is a greater degree of cohesion in thought between its elements, than between the elements of the counter proposition. Thus testing the strength of each link in the argument, he at length reaches the conclusion, which he tests in the same way. If he accepts it, he does so because the argument has established in him an indirect cohesion between states of consciousness that were not directly coherent, or not so coherent directly as the argument makes them indirectly. But he accepts it only supposing that the connexion between the two states of consciousness composing it, is not resisted by some stronger counter-connexion. If there happens to be an opposing argument, of which the component thoughts are felt, when tested, to be more coherent; or if, in the absence of an opposing argument, there exists an opposing conclusion, of which the elements have some direct cohesion greater than that which the proffered argument indirectly gives; then the conclusion reached by this argument is not admitted. Thus, a discussion in consciousness proves to be simply a trial of strength between different connexions in consciousness—a systematized struggle serving to determine which are the least coherent states of consciousness. And the result of the struggle is, that the least coherent states of consciousness separate, while the most coherent remain together—form a proposition of which the predicate persists in rising up in the mind along with its subject—constitute one of the connexions in thought which is distinguished as something known, or as something believed, according to its strength.

What corollary may the inquirer draw, or rather what corollary must he draw, on pushing the analysis to its limit? If there are any indissoluble connexions, he is compelled to accept them. If certain states of consciousness absolutely cohere in certain ways, he is obliged to think them in those ways. The proposition is an identical one. To say that they are necessities of thought is merely another way of saying that their elements cannot be torn asunder. No reasoning can give to these absolute cohesions in thought any better warrant; since all reasoning, being a process of testing cohesions, is itself carried on by accepting the absolute cohesions; and can, in the last resort, do nothing more than present some absolute cohesions in justification of others—an act which unwarrantably assumes in the absolute cohesions it offers, a greater value than is allowed to the absolute cohesions it would justify. Here, then, the inquirer comes down to an ultimate mental uniformity—a universal law of his thinking. How completely his thought is subordinated to this law, is shown by the fact that he cannot even represent to himself the possibility of any other law. To suppose the connexions among his states of consciousness to be otherwise determined, is to suppose a smaller force overcoming a greater—a proposition which may be expressed in words but cannot be rendered into ideas. No matter what he calls these indestructible relations, no matter what he supposes to be their meanings, he is completely fettered by them. Their indestructibility is the proof to him that his consciousness is imprisoned within them; and supposing any of them to be

in some way destroyed, he perceives that indestructibility would still be the distinctive character of the bounds that remained—the test of those which he must continue to think.

These results the inquirer arrives at without assuming any other existence than that of his own consciousness. They postulate nothing about mind or matter, subject or object. They leave wholly untouched the questions—what does consciousness imply? and how is thought generated? There is not involved in the analysis any hypothesis respecting the origin of these relations between thoughts—how there come to be feeble cohesions, strong cohesions, and absolute cohesions. Whatever some of the terms used may have seemed to connote, it will be found, on examining each step, that nothing is essentially involved beyond states of mind and the connexions among them, which are themselves other states of mind. Thus far, the argument is not vitiated by any *petitio principii*.

Should the inquirer enter upon the question, How are these facts to be explained? he must consider how any further investigation is to be conducted, and what is the possible degree of validity of its conclusions. Remembering that he cannot transcend consciousness, he sees that anything in the shape of an interpretation must be subordinate to the laws of consciousness. Every hypothesis he entertains in trying to explain himself to himself, being an hypothesis which can be dealt with by him only in terms of his mental states, it follows that any process of explanation must itself be carried on by testing the cohesions among mental states, and accepting the absolute cohesions. His conclusions, therefore, reached only by repeated recognitions of this test of absolute cohesion, can never have any higher validity than this test. It matters not what name he gives to a conclusion—whether he calls it a belief, a theory, a fact, or a truth. These words can be themselves only names for certain relations among his states of consciousness. Any secondary meanings which he ascribes to them must also be meanings expressed in terms of consciousness, and therefore subordinate to the laws of consciousness. Hence he has no appeal from this ultimate dictum; and seeing this, he sees that the only possible further achievement is the reconciliation of the dicta of consciousness with one another—the bringing all other dicta of consciousness into harmony with this ultimate dictum.

Here, then, the inquirer discovers a warrant higher than that which any argument can give, for asserting an objective existence. Mysterious as seems the consciousness of something which is yet out of consciousness, he finds that he alleges the reality of this something in virtue of the ultimate law—he is obliged to think it. There is an indissoluble cohesion between each of those vivid and definite states of consciousness which he calls a sensation, and an indefinable consciousness which stands for a mode of being beyond sensation, and separate from himself. When grasping his fork and putting food into his mouth, he is wholly unable to expel from his mind the notion of something which resists the force he is conscious of using; and he cannot suppress the nascent thought of an independent existence keeping apart his tongue and palate, and giving him that sensation of taste which he is unable to generate in consciousness by his own activity. Though self-criticism shows him that he cannot know what this is which lies outside of him; and though he may infer that not being able to say what it is, it is a fiction; he discovers that such self-criticism utterly fails to extinguish the consciousness of it as a reality. Any conclusion into which he argues himself, that there is no objective existence connected with these subjective states, proves to be a mere verbal conclusion to which his thoughts will not respond. The relation survives

every effort to destroy it—is proved by experiment, repeated no matter how often, to be one of which the negation is inconceivable; and therefore one having supreme authority. In vain he endeavours to give it any greater authority by reasoning; for whichever of the two alternatives he sets out with, leaves him at the end just where he started. If, knowing nothing more than his own states of consciousness, he declines to acknowledge any thing beyond consciousness until it is proved, he may go on reasoning for ever without getting any further; since the perpetual elaboration of states of consciousness out of states of consciousness, can never produce anything more than states of consciousness. If, contrariwise, he postulates external existence, and considers it as merely postulated, then the whole fabric of his argument, standing upon this postulate, has no greater validity than the postulate gives it, *minus* the possible invalidity of the argument itself. The case must not be confounded with those cases in which an hypothesis, or provisional assumption, is eventually proved true by its agreement with facts; for in these cases the facts with which it is found to agree, are facts known in some other way than through the hypothesis: a calculated eclipse of the moon serves as a verification of the hypothesis of gravitation, because its occurrence is observable without taking for granted the hypothesis of gravitation. But when the external world is postulated, and it is supposed that the validity of the postulate may be shown by the explanation of mental phenomena which it furnishes, the vice is, that the process of verification is itself possible only by assuming the thing to be proved.

But now, recognizing the indissoluble cohesion between the consciousness of *self* and an unknown *not-self*, as constituting a dictum of consciousness which he is both compelled to accept and is justified by analysis in accepting, it is competent for the inquirer to consider whether, setting out with this dictum, he can base on it a satisfactory explanation of what he calls knowledge. He finds such an explanation possible. The hypothesis that the more or less coherent relations among his states of consciousness, are generated by experience of the more or less constant relations in something beyond his consciousness, furnishes him with solutions of numerous facts of consciousness: not, however, of all, if he assumes that this adjustment of inner to outer relations has resulted from his own experiences alone. Nevertheless, if he allows himself to suppose that this moulding of thoughts into correspondence with things, has been going on through countless preceding generations; and that the effects of experiences have been inherited in the shape of modified organic structures; then he is able to interpret all the phenomena. It becomes possible to understand how these persistent cohesions among states of consciousness, are themselves the products of often-repeated experiences; and that even what are known as "forms of thought," are but the absolute internal uniformities generated by infinite repetitions of absolute external uniformities. It becomes possible also to understand how, in the course of organizing of these multiplying and widening experiences, there may arise partially-wrong connexions in thought, answering to limited converse with things; and that these connexions in thought, temporarily taken for indissoluble ones, may afterwards be made dissoluble by presentation of external relations at variance with them. But even when this occurs, it can afford no ground for questioning the test of indissolubility; since the process by which some connexion previously accepted as indissoluble, is broken, is simply the establishment of some antagonistic connexion, which proves, on a trial of strength, to be the stronger—which remains indissoluble when pitted against the other, while the other gives way. And this leaves the test just where it was; showing only that there is a liability to error as to what *are*

indissoluble connexions. From the very beginning, therefore, to the very end of the explanation, even down to the criticism of its conclusions and the discovery of its errors, the validity of this test must be postulated. Whence it is manifest, as before said, that the whole business of explanation can be nothing more than that of bringing all other dicta of consciousness into harmony with this ultimate dictum.

To the positive justification of a proposition, may be added that negative justification which is derived from the untenability of the counter-proposition. When describing the attitude of pure Empiricism, some indications that its counter-proposition is untenable were given; but it will be well here to state, more specifically, the fundamental objections to which it is open.

If the ultimate test of truth is not that here alleged, then what is the ultimate test of truth? And if there is no ultimate test of truth, then what is the warrant for accepting certain propositions and rejecting others? An opponent who denies the validity of this test, may legitimately decline to furnish any test himself, so long as he does not affirm any thing to be true; but if he affirms some things to be true and others to be not true, his warrant for doing so may fairly be demanded. Let us glance at the possible response to the demand. If asked why he holds it to be unquestionably true that two quantities which differ in unequal degrees from a third quantity are themselves unequal, two replies seem open to him: he may say that this is an ultimate fact of consciousness, or that it is an induction from personal experiences. The reply that it is an ultimate fact of consciousness, raises the question, How is an ultimate fact of consciousness distinguished? All beliefs, all conclusions, all imaginations even, are facts of consciousness; and if some are to be accepted as beyond question because ultimate, while others are not to be accepted as beyond question because not ultimate, there comes the inevitable inquiry respecting the test of ultimacy. On the other hand, the reply that this truth is known only by induction from personal experiences, suggests the query—On what warrant are personal experiences asserted? The testimony of experience is given only through memory; and its worth depends wholly on the trustworthiness of memory. Is it, then, that the trustworthiness of memory is less open to doubt than the immediate consciousness that two quantities must be unequal if they differ from a third quantity in unequal degrees? This can scarcely be alleged. Memory is notoriously uncertain. We sometimes suppose ourselves to have said things which it turns out we did not say; and we often forget seeing things which it is proved we did see. We speak of many passages of our lives as seeming like dreams; and can vaguely imagine the whole past to be an illusion. We can go much further toward conceiving that our recollections do not answer to any actualities, than we can go toward conceiving the non-existence of Space. But even supposing the deliverances of memory to be above criticism, the most that can be said for the experiences to which memory testifies, is that we are obliged to think we have had them—cannot conceive the negation of the proposition that we have had them; and to say this is to assign the warrant which is repudiated.

A further counter-criticism may be made. Throughout the argument of pure Empiricism, it is tacitly assumed that there may be a Philosophy in which nothing is asserted but what is proved. It proposes to admit into the coherent fabric of its conclusions, no conclusion that is incapable of being established by evidence; and it thus takes for granted that not only may all derivative truths be proved, but also that proof may be given of the truths from which they are derived, down to the very deepest. The result of thus refusing to recognize some fundamental unproved truth, is simply

to leave its fabric of conclusions without a base. The giving proof of any special proposition, is the assimilation of it to some class of propositions known to be true. If any doubt arises respecting the general proposition which is cited in justification of this special proposition, the course is to show that this general proposition is deducible from a proposition or propositions of still greater generality; and if pressed for proof of each such still more general proposition, the only resource is to repeat the process. Is this process endless? If so, nothing can be proved—the whole series of propositions depends on some unassignable proposition. Has the process an end? If so, there must eventually be reached a widest proposition—one which cannot be justified by showing that it is included by any wider—one which cannot be proved. Or to put the argument otherwise: Every inference depends on premises; every premise, if it admits of proof, depends on other premises; and if the proof of the proof be continually demanded, it must either end in an unproved premise, or in the acknowledgment that there cannot be reached any premise on which the entire series of proofs depends. Hence Philosophy, if it does not avowedly stand on some datum underlying reason, must acknowledge that it has nothing on which to stand.

The expression of divergence from Mr. Mill on this fundamental question, I have undertaken with reluctance, only on finding it needful, both on personal and on general grounds, that his statements and arguments should be met. For two reasons, especially, I regret having thus to contend against the doctrine of one whose agreement I should value more than that of any other thinker. In the first place, the difference is, I believe, superficial rather than substantial; for it is in the interests of the Experience-Hypothesis that Mr. Mill opposes the alleged criterion of truth; while it is as harmonizing with the Experience-Hypothesis, and reconciling it with all the facts, that I defend this criterion. In the second place, this lengthened exposition of a single point of difference, unaccompanied by an exposition of the numerous points of concurrence, unavoidably produces an appearance of dissent very far greater than that which exists. Mr. Mill, however, whose unswerving allegiance to truth is on all occasions so conspicuously displayed, will fully recognize the justification for this utterance of disagreement on a matter of such profound importance, philosophically considered; and will not require any apology for the entire freedom with which I have criticised his views while seeking to substantiate my own.

USE AND BEAUTY

(1852)

In one of his essays, Emerson remarks, that what Nature at one time provides for use, she afterwards turns to ornament; and he cites in illustration the structure of a sea-shell, in which the parts that have for a while formed the mouth are at the next season of growth left behind, and become decorative nodes and spines.

Ignoring the implied teleology, which does not here concern us, it has often occurred to me that this same remark might be extended to the progress of Humanity. Here, too, the appliances

of one era serve as embellishments to the next. Equally in institutions, creeds, customs, and superstitions, we may trace this evolution of beauty out of what was once purely utilitarian.

The contrast between the feeling with which we regard portions of the Earth's surface still left in their original state, and the feeling with which the savage regarded them, is an instance that comes first in order of time. If any one walking over Hampstead Heath, will note how strongly its picturesqueness is brought out by contrast with the surrounding cultivated fields and the masses of houses lying in the distance; and will further reflect that, had this irregular gorse-covered surface extended on all sides to the horizon, it would have looked dreary and prosaic rather than pleasing; he will see that to the primitive man a country so clothed presented no beauty at all. To him it was merely a haunt of wild animals, and a ground out of which roots might be dug. What have become for us places of relaxation and enjoyment—places for afternoon strolls and for gathering flowers —were his places for labour and food, probably arousing in his mind none but utilitarian associations.

Ruined castles afford obvious instances of this metamorphosis of the useful into the beautiful. To feudal barons and their retainers, security was the chief, if not the only end, sought in choosing the sites and styles of their strongholds. Probably they aimed as little at the picturesque as do the builders of cheap brick houses in our modern towns. Yet what were erected for shelter and safety, and what in those early days fulfilled an important function in the social economy, have now assumed a purely ornamental character. They serve as scenes for picnics; pictures of them decorate our drawing-rooms; and each supplies its surrounding districts with legends for Christmas Eve.

On following out the train of thought suggested by this last illustration, we may see that not only do the material exuviæ of past social states become the ornaments of our landscapes; but that past habits, manners, and arrangements, serve as ornamental elements in our literature. The tyrannies which, to the serfs who bore them, were harsh and dreary facts; the feuds which, to those who took part in them, were very practical life-and-death affairs; the mailed, moated, sentinelled security which was irksome to the nobles who needed it; the imprisonments, and tortures, and escapes, which were stern and quite prosaic realities to all concerned in them; have become to us material for romantic tales—material which, when woven into *Ivanhoes* and *Marmions*, serves for amusement in leisure hours, and becomes poetical by contrast with our daily lives.

Thus, also, is it with extinct creeds. Stonehenge, which in the hands of the Druids had a governmental influence over men, is in our day a place for antiquarian excursions; and its attendant priests are worked up into an opera. Greek sculptures, preserved for their beauty in our galleries of art, and copied for the decoration of pleasure grounds and entrance halls, once lived in men's minds as gods demanding obedience; as did also the grotesque idols that now amuse the visitors to our museums.

Equally marked is this change of function in the case of minor superstitions. The fairy lore, which in past times was matter of grave belief, and held sway over people's conduct, has since been transformed into ornament for *A Midsummer Night's Dream*, *The Tempest*, *The Fairy Queen*, and endless small tales and poems; and still affords subjects for children's story-books, themes for ballets, and plots for Planché's burlesques. Gnomes, and genii, and afrits, losing their terrors, give piquancy to the woodcuts in our illustrated edition of the *Arabian Nights*. While ghost-stories, and tales of magic and witchcraft, after serving to amuse boys and girls in their leisure hours, become

matter for jocose allusions that enliven tea-table conversation.

Even our serious literature and our speeches are relieved by ornaments drawn from such sources. A Greek myth is often used as a parallel by which to vary the monotony of some grave argument. The lecturer breaks the dead level of his practical discourse by illustrations drawn from bygone customs, events, or beliefs. And metaphors, similarly derived, give brilliancy to political orations, and to *Times* leading articles.

Indeed, on careful inquiry, I think it will be found that we turn to purposes of beauty most bygone phenomena which are at all conspicuous. The busts of great men in our libraries, and their tombs in our churches; the once useful but now purely ornamental heraldic symbols; the monks, nuns, and convents, which give interest to a certain class of novels; the bronze mediæval soldiers used for embellishing drawing-rooms; the gilt Apollos which recline on time-pieces; the narratives that serve as plots for our great dramas; and the events that afford subjects for historical pictures;—these and such like illustrations of the metamorphosis of the useful into the beautiful, are so numerous as to suggest that, did we search diligently enough, we should find that in some place, or under some circumstance, nearly every notable product of the past has assumed a decorative character.

And here the mention of historical pictures reminds me that an inference may be drawn from all this, bearing directly on the practice of art. It has of late years been a frequent criticism upon our historical painters, that they err in choosing their subjects from the past; and that, would they found a genuine and vital school, they must render on canvas the life and deeds and aims of our own time. If, however, there be any significance in the foregoing facts, it seems doubtful whether this criticism is a just one. For if it be the course of things that what has performed some active function in society during one era, becomes available for ornament in a subsequent one; it almost follows that, conversely, whatever is performing some active function now, or has very recently performed one, does not possess the ornamental character; and is, consequently, inapplicable to any purpose of which beauty is the aim, or of which it is a needful ingredient.

Still more reasonable will this conclusion appear, when we consider the nature of this process by which the useful is changed into the ornamental. An essential pre-requisite to all beauty is *contrast*. To obtain artistic effect, light must be put in juxtaposition with shade, bright colours with dull colours, a fretted surface with a plain one. *Forte* passages in music must have *piano* passages to relieve them; concerted pieces need interspersing with solos; and rich chords must not be continuously repeated. In the drama we demand contrast of characters, of scenes, of sentiment, of style. In prose composition an eloquent passage should have a comparatively plain setting; and in poems great effect is obtained by occasional change of versification. This general principle will, I think, explain the transformation of the bygone useful into the present beautiful. It is by virtue of their contrast with our present modes of life, that past modes of life look interesting and romantic. Just as a picnic, which is a temporary return to an aboriginal condition, derives, from its unfamiliarity, a certain poetry which it would not have were it habitual; so, everything ancient gains, from its relative novelty to us, an element of interest. Gradually as, by the growth of society, we leave behind the customs, manners, arrangements, and all the products, material and mental, of a bygone age—gradually as we recede from these so far that there arises a conspicuous difference between them and those we are familiar with; so gradually do they begin to assume to us a poetical aspect, and become applicable

for ornament. And hence it follows that things and events which are close to us, and which are accompanied by associations of ideas not markedly contrasted with our ordinary associations, are *relatively* inappropriate for purposes of art. I say relatively because an incident of modern life or even of daily life may acquire adequate fitness for art purposes by an unusualness of some other kind than that due to unlikeness between past and present.

